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ABSTRACT

The report of highlights of the conference on Instructional Technology in the Education of Exceptional Children presents innovative ideas in the field of media useful to teachers and program administrators. Specific classroom applications of various media are described to illustrate the concepts that media give exceptional students new communications modalities, enhance teacher communication skills, add new dimensions to learning and teaching, and make individualized instruction a reality. Also reported are planning ideas and problems, and suggestions for planning instructional systems, delivery systems (instructional resource centers), development of instructional materials, and support for teachers in their use of media. Emphasized is the systems analysis approach to organized planning and the critical role of feedback. The final section describes projects and plans for mediated teacher training packages designed to solve problems related to the increasing number of trainees, the need for on-the-job training, and the need to provide necessary evaluation and feedback. Numerous photographs illustrate the applications of media described. (KW)

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KALEIDOSCOPE
Emerging Patterns in Media

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Evelyn R. Blum

P. Elaine Barker

Editors

Action Highlights of the December 1970 CEC San Antonio Conference

The Council for Exceptional Children, Suite 900
1411 South Jefferson Davis Highway, Arlington, Virginia 22202

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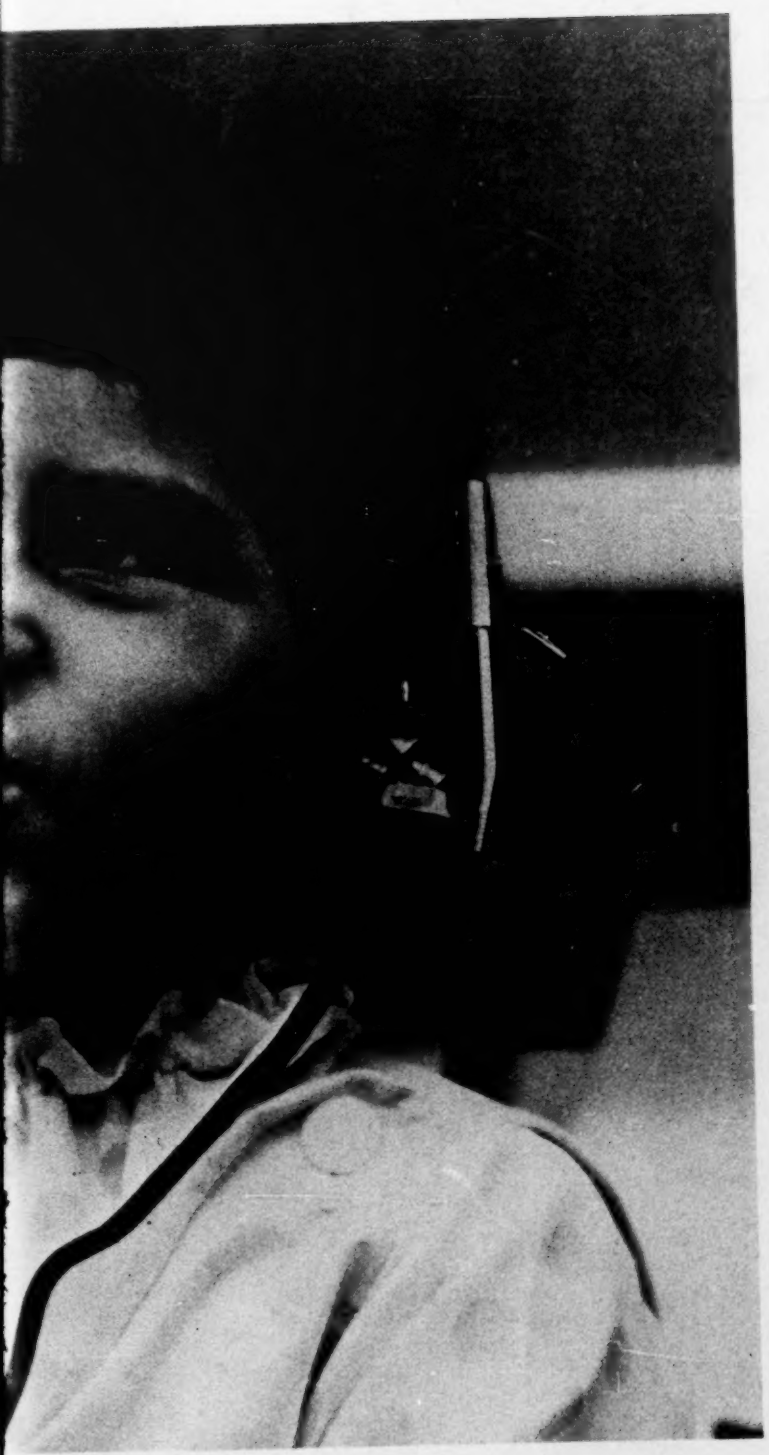

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"It's one of those times when substantial change seems to be in the wind. What we really have to decide is whether the change will be improvement."

James J. Gallagher

"Individualization as it relates to the new education means prescriptive instruction, not isolated learning experience. Possibly personalization is a more descriptive term than individualization."

Lawrence Stolurow

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Preface

Instructional Technology in the Education of Exceptional Children was the topic for the CEC conference held in San Antonio, Texas in December 1970. This publication is a special report of that conference. It is our hope that teachers and program administrators will not only use the many innovative ideas presented but will also be stimulated to apply their own creativity and generate new applications of media to solve problems unique to their classrooms.

This conference on educational technology was not an ordinary meeting where participants listened to prepared speeches. There was an unusually high level of interest and activity. The bulk of the meetings were workshops, media demonstrations, and open discussions in which presenters communicated through media their ideas for the applications of media. Films, filmstrips, slides, and even computer programs were included in presentations. Moreover, educators looking to technology for the solution to classroom problems asked questions. In addition the exhibit area was filled with demonstrations of educational toys, teaching machines, filmstrips, computerized instructional programs, and machines to prepare instructional materials.

Since taped transcripts of all session meetings and photographs of equipment were available offering a wide range of practical suggestions for teachers and administrators,

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Since taped transcripts of all session meetings and photographs of equipment were available offering a wide range of practical suggestions for teachers and administrators, the CEC Information Center felt that a special publication was essential. This publication represents a culling and reorganization of both taped transcripts and prepared conference papers.

We would like to give special thanks for providing the photographs for this publication to the Western Interstate Commission on Higher Education, Boulder, Colorado; Johnny Jenkins, Austin, Texas; Rose G. Engel, Salvin School, Los Angeles, California; Manfred Brand, Mid-Atlantic Regional Instructional Materials Center, George Washington University, Washington, D.C.; Gary Trexler, CEC Headquarters, Arlington, Virginia; National Audio-Visual Association, Fairfax, Virginia; Phillip Cartwright, Computer Assisted Instruction Laboratory, University Park, Pennsylvania; and Elizabeth Howe, Gateway School, Orlando, Florida. We owe a special debt of gratitude to Dr. Bluma B. Weiner, Chairman, Department of Special Education, Yeshiva University, for her expert editorial assistance and guidance.

E.R.B.

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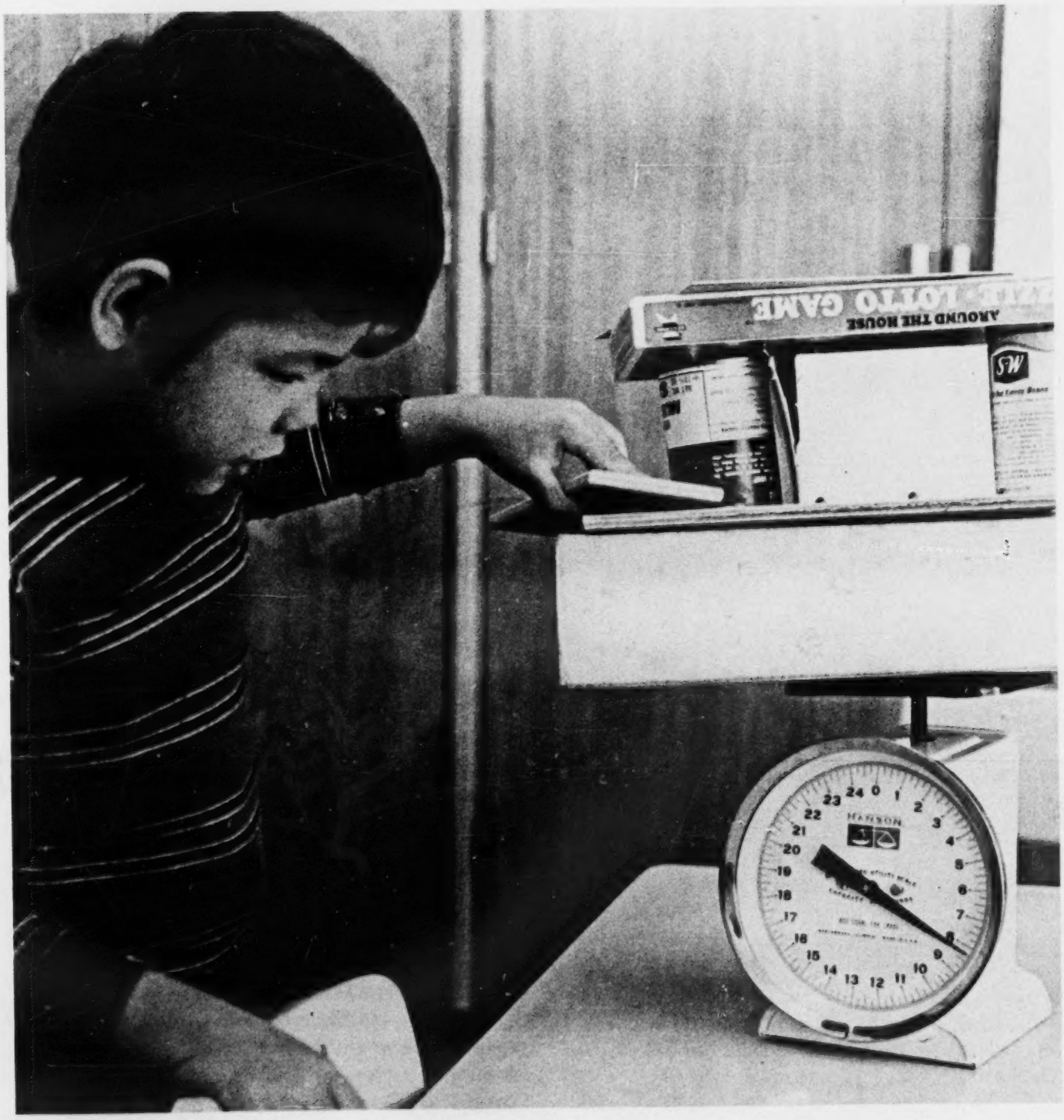
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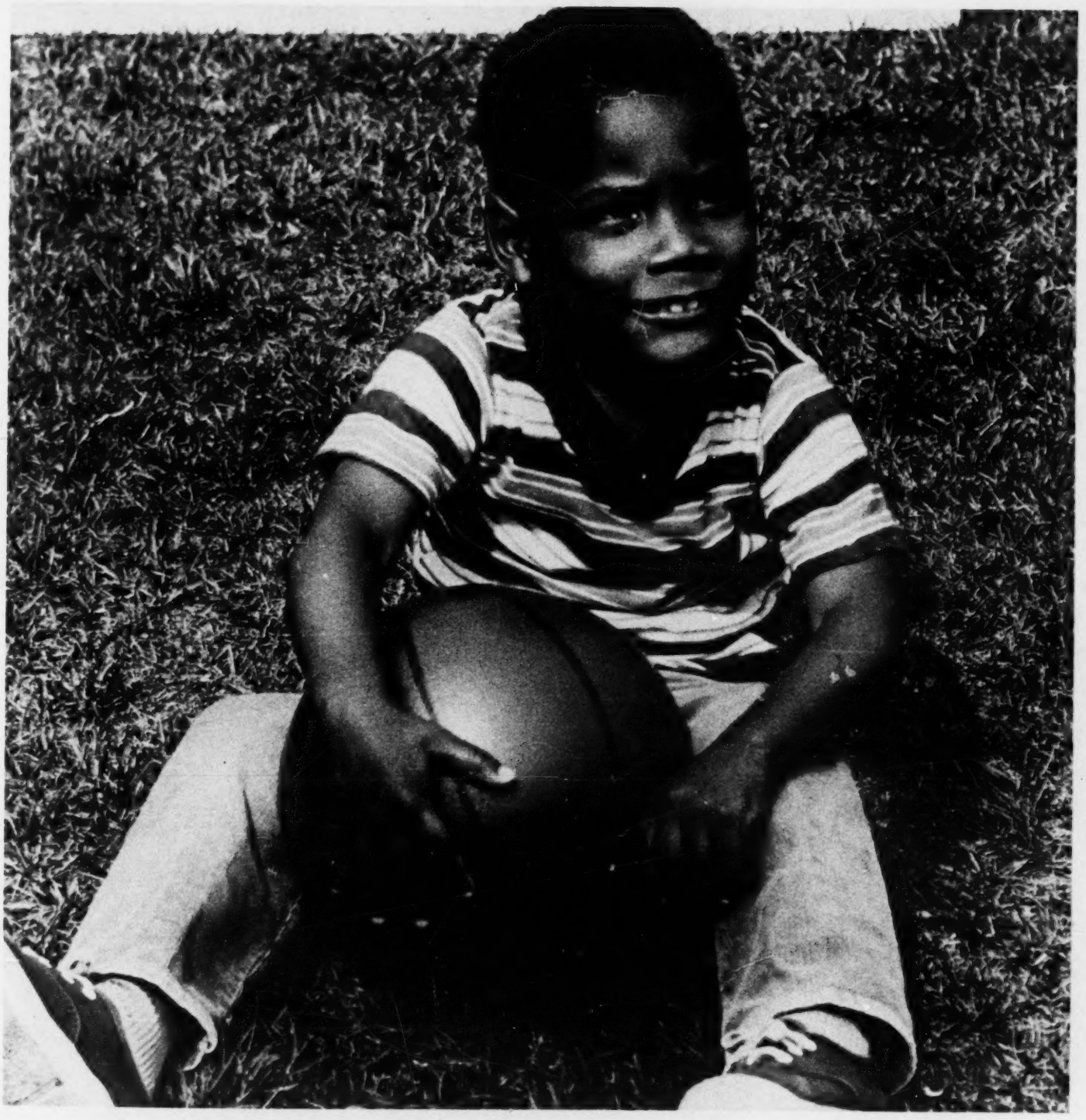

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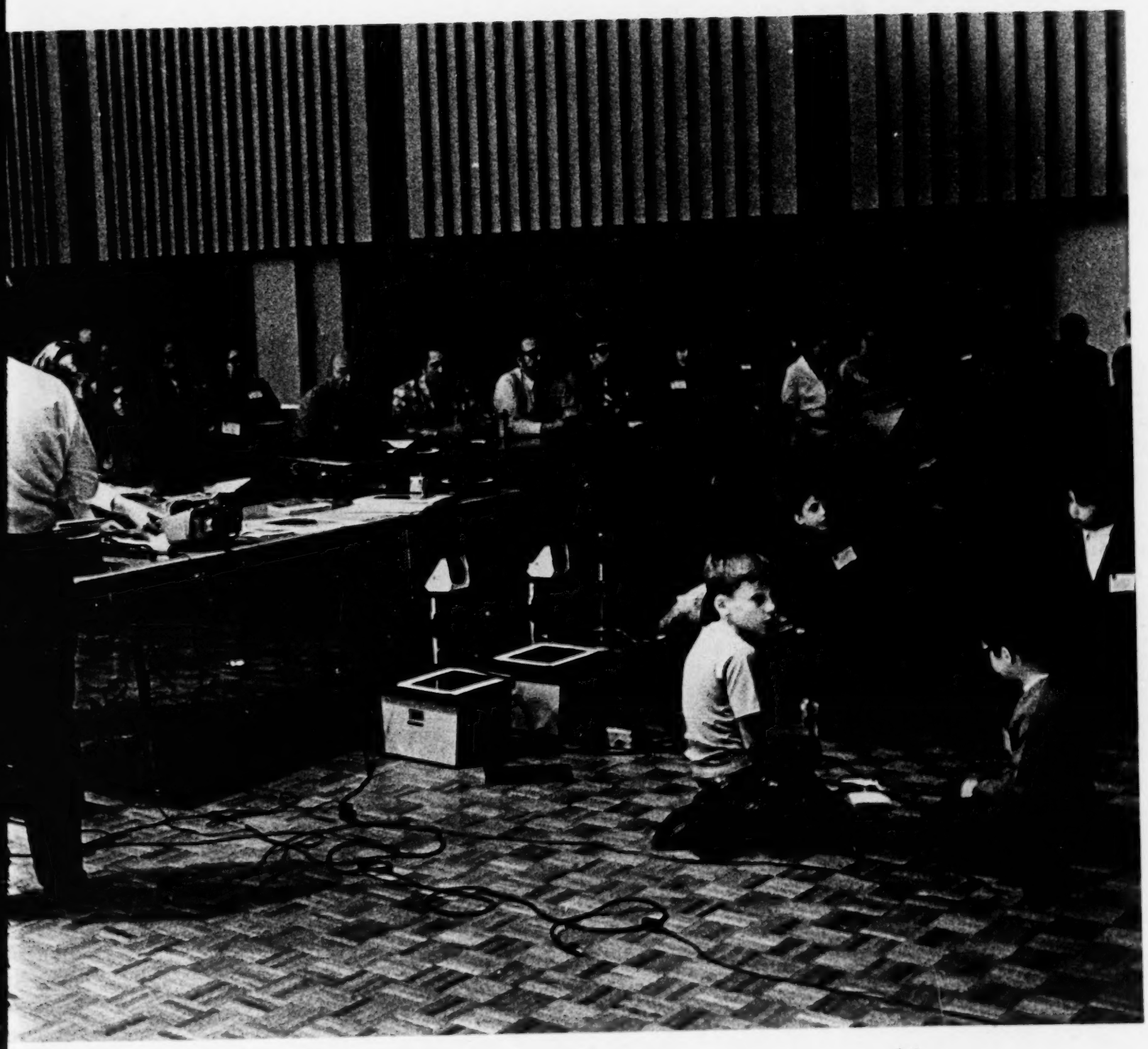
Introduction

"Each of us cannot have
his own shoemaker or tailor,
and it appears that each child who needs help
cannot have his own special teacher either.
Can media and technology help?
They had better."

James J. Gallagher



This book is about two technologies: the technology of conventions and the technology of instruction. In a recent telephone conversation Robert C. Snider (Assistant Director, Division of Educational Technology, National Education Association) defined the term technology. He commented, "When we say technology we are not referring to the machines or the hardware. When we talk about technology we really mean the effect machines and hardware have upon humans and human behavior. When you apply machines to any human behavior you alter the behavior. The resultant change which occurs is the technology."

Stimulated by Dr. Snider's definition, the editors then asked the questions: What is the technology of a convention? What effect does a convention or conference have on a field of endeavor? If you yourself have recently attended a convention you might think immediately of the interesting people you met, the exciting social events you attended, the quiet walk through a new town, and perhaps even one or two new techniques which you brought back and tried in your classroom. These thoughts would describe some direct effects on you as a professional attending a conference. But what of the indirect effect, a more subtle one, which the convention process has on the entire field of education, in our case the education of exceptional children.

The impact of a conference or convention can be roughly compared to the design inside a kaleidoscope. When you slowly turn a kaleidoscope the many symmetrical, multicolored pieces of glass shift slightly to form a new design. Sometimes the new design is sharply different from the previous ones and at other times the new design resembles the previous one so closely that the difference is barely perceptible. For us a convention or conference is the half turn of the kaleidoscope which produces a new design in special education. The postconvention configuration roughly approximates the preconvention gestalt, but there are subtle differences. There will be a new balance of forces, direction, and trends which will shift to chart a slightly different course; new themes will appear and traditional ones will be reinforced or possibly abandoned.

The call for convention papers is the first step in the change process. Reseachers, teachers, administrators alike assess their previous year or years of work to determine if a benchmark has been reached. Professionals ask themselves if their work is ready to be reported to the field. Often the preparation for reporting forces a crystallization earlier than it would occur through natural processes. In order to be shared with others the research or development sometimes needs to be placed more squarely in the context of the field; sometimes project results need to be carried

to new levels of abstraction for results to be meaningful; at times additional decisions need to be made, and wider implications are drawn to ready a project for reporting. Sometimes the decision to report is made on the basis of whether or not a project is related to critical national problems.

The net effect is a reorganization, reassessment, and a pulling together with the field becoming more finely structured. The post-convention impact is a mirroring of the redirection and new structuring which occur in the preparation for convention reporting. Understanding the effect of a convention on a field of knowledge, we decided that by an analysis of conference reports a publication could be prepared which would essentially be a state-of-the-art report for special education and a forecast of impending changes. This publication then is an attempt to fulfill these goals.

Three major themes or concerns permeated the conference. The publication is organized about these themes:

1. Classroom Applications.
2. Planning for Change.
3. Teacher Training Packages.

In the area of classroom application, several exciting ideas seemed to emerge simultaneously from different areas of the country. Perhaps the most important one was the concept that media should be shared with students. Educators claim that one reason teachers should use media in the classroom is that it enhances the teacher's ability to communicate. Special educators are asking why not apply the same principle to students, allow students to prepare transparencies for a more interesting oral presentation. In the
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interesting oral presentation. In the case of exceptional children, the results are dramatic. In many instances, particularly with a deaf child or cerebral palsy victim, media can become a substitute for lost communications modalities. A deaf student, who due to problems in speech production once felt uncomfortable presenting an oral report, now has a new range of techniques through which to relate to peers and teachers and is no longer required to rely on his own voice productions for communication. This same concept could applied to other students with handicapping conditions, such as the retarded or behaviorally handicapped; often these students also suffer from an inability to communicate.

A second concept highlighted frequently by participants related to the way in which media changed the teacher's job. Media, the participants pointed out, gave the teacher new choices of techniques to produce greater variety in the learning environment, new ways of relating to students, and new curriculum designs to meet the needs of individual students.

Perhaps the most important idea presented at the conference is one which has vast potential for affecting student development in the classroom. This idea was discussed primarily by those involved with the development of computer assisted instruction (CAI). Generally the idea is labeled *adaptive education.* History has fashioned teachers' attitudes toward students. For centuries educators have categorized students into groups, believing some will pass the exams and others will fail. Media and individualized instruction through media are revolutionizing education. Technologists have shown teachers that this attitudinal set that has been so damaging to students is no longer realistic in modern society.

Little is gained by determining that a certain group of students "passes" a test while a second group "fails." This approach basically serves the educational system, not the student. Media not only allow teachers to move students at their individual learning rate, but technology such as CAI has provided a model to show the teacher how. The teacher *could* prepare an appropriate individual curriculum without the use of hardware. Parenthetically, it should be added that technology such as CAI does allow the teacher to manage individual learning more easily.

If teachers can eliminate grade levels in their attitudes and curriculums, then when a child needs 2 or 6 years to cover an academic program he can complete the curriculum in either length of time and truly have learned, not just skipped along performing only the easiest exercise for each concept introduced. The advantage is that the child is no longer labeled the class failure, because no one fails in the old sense of the word; each child advances at his own rate.

Planning for change. If you, the reader, had attended the conference, you would have been aware of an undercurrent of concern about how to change present practices in special education. James J. Gallagher in the kick-off session verbalized what many were thinking. He said, "It's one of those times when substanial change seems to be in the wind. What we really have to decide is whether the change will be improvement."

It was evident that many planners, whether in instructional systems or individual instructional materials, have begun to think in terms of the interrelationship between the components of a system whether that system is a whole school district or a single

classroom. This approach to organized planning is called systems analysis. Applications of systems theory in planning have the overall effect of expanding thinking and planning for new heights of imagination and efficiency.

One principle in systems theory, for example, is that when you plan a system you should assess all the pertinent facilities, then incorporate these into a system which can accomplish your objective. One dramatic example of the application of this theory is the plan for the validation of instructional materials described by Gilbert Delgado, Bureau of Education for the Handicapped, US Office of Education. He pointed out that if one looks, there are many facilities available to perform various functions necessary to validate instructional materials: state education agencies, university centers, large school districts, industry. A system for validating instructional materials could be built by seeking the coordination of all of these currently disjointed elements. Surveying resources forces the planner to first establish his objectives, widen his horizons to explore *all* available resources, and assign functions to the different subsystems.

A second aspect of systems theory embraced by educators and planners was the critical role of feedback. Administrators now recognize that feedback is critical throughout the educational system to insure that objectives are met. Teachers need feedback from administrators, students need feedback from teachers, so that no one in the system veers to far off course to a point where corrections are no longer possible. Efficiency in terms of dollars and of human and material resources seems to be the motivating force in this age of accountability. The secondary gain of a satisfied staff with high morale is also important.

Teacher education. No one participant presented a paper to describe the problems facing teacher educators in the 70's. The problems were implicit however in the projects and plans for mediated teacher training packages. Many such packages were described; all seemed designed to solve certain problems:

1. The need to train increasingly larger numbers of teachers.
2. The need to provide "on the job" training, often in remote geographic areas.
3. The need to maintain personal contact with the trainer — to provide necessary evaluation and feedback.

It should be pointed out that it became evident through an assessment of all the information presented at the conference that perhaps the area of handicapping conditions in which instructional technology is used most actively is the area of the deaf. There are many reasons why this is so — the fact that deaf students have the most severe communication problems of all handicapped children is a very cogent reason. Therefore motivation among educators of the deaf to apply media to problems in their classrooms is very high. These teachers are to be commended for their many innovative uses of technology.

The editors of this publication did not attempt to prepare an all inclusive report of the innumerable ideas brought to San Antonio to be shared with others. Our aim is to offer representative samples of ideas with the intent that teachers, administrators, and teacher educators can then apply their own creative energies to expand and develop new applications of these ideas.

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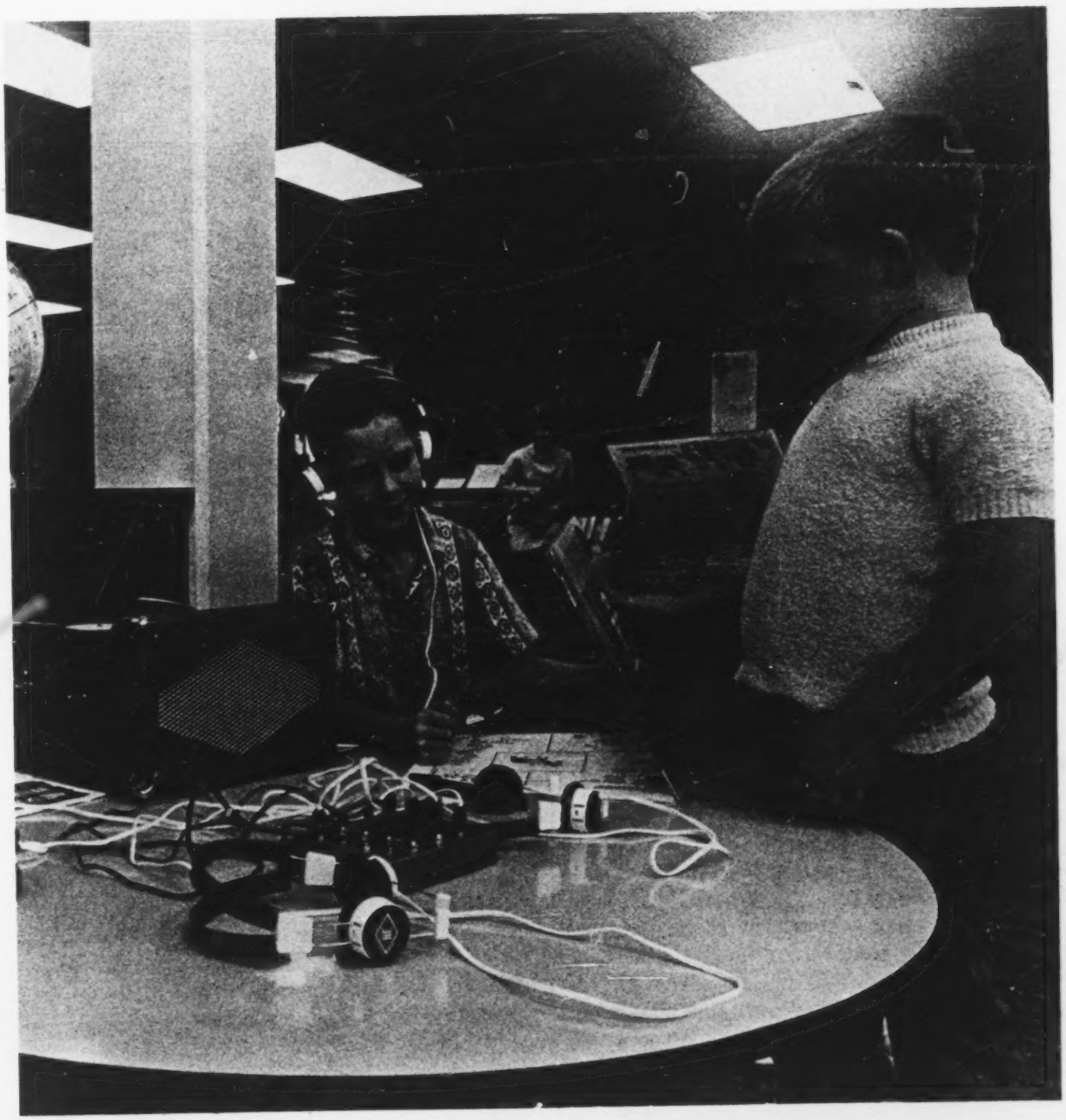
There are three factors in the formula for change in education: creative energy + inspiration and direction + critical problems = change. Change in educational practices occurs in proportion to educators' creative energies that are directed towards critical problems. Two factors in the formula are present: creative energy of educators is almost unlimited, and critical problems are indeed present and crucial in terms of our future. We hope this publication in some small way has been able to harness convention power by exploring the impact of educational technology on special education and has been able to provide some direction and inspiration to you, the educators, the third factor in our formula. In this way perhaps the field will move somewhat closer to its objective - PROGRESS THROUGH CHANGE.

P.L.M.



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Classroom Applications

"We must use the power of technology
to enter into a new world of education
that says the child can learn and
that failure occurs through errors
in the system and not in the child. Education
has the power through modern technology
to provide the world for the child
to experience and to explore.
Through the touch of dials we can recreate
and stimulate the past experiences from history
or explore remote places."

Frank Withrow

CONCEPT: MEDIA GIVES EXCEPTIONAL STUDENTS NEW COMMUNICATIONS MODALI

The media are communications devices for the educational process. They facilitate interaction skills, not only for the teacher but for the student. In most schools media centers are available for teacher use to communicate with students, but students are not always given an opportunity to respond through media. (Ronald Kelly)

Application: **Student reports can be improved through media.**

Media: **Transparencies and other forms of media**

It's almost impossible to get deaf children to give oral reports, but I observed five children in one class giving them. They used media to communicate with the other children, ask questions, and talk back and forth. The media force children to develop presentation, creative, and social skills.

One teacher encouraged a deaf student to make transparencies to illustrate a story the student wrote. The child showed that a cat eats catnip, not a balloon, and that a cat can be held up to a window to see the world go by. With very limited language, she effectively related to the other children where her

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Application: **Media help reticent students to solve problems in groups and reach decisions.**

Media: **Slide and overhead projectors**

Another interesting idea which can be related to social skills in instruction has been developed at Indiana University by Sivasailam Thiagarajan and others. It is called the group program process. The basic idea is to structure a group problem solving situation. A tape driven slide projector presents the problem for discussion. Chairman and recorder functions are delegated to members of the group. Time limits are imposed. The slide projector is used to prompt the students to adhere to schedules for discussion. Each participant's contribution is recorded on the overhead projector as it is made. Ultimately a group decision is reached and recorded.

I have had several opportunities to observe groups of adults use the group program approach and have been impressed by the amount of interaction and efficient progress toward closure. Deaf children's weaknesses in group decision making and in purposeful discussion suggests to me that this technique for helping them should be explored. (Hubert Summers)

Application: **Students' interest in subject matter increases when they use media for reporting study results.**

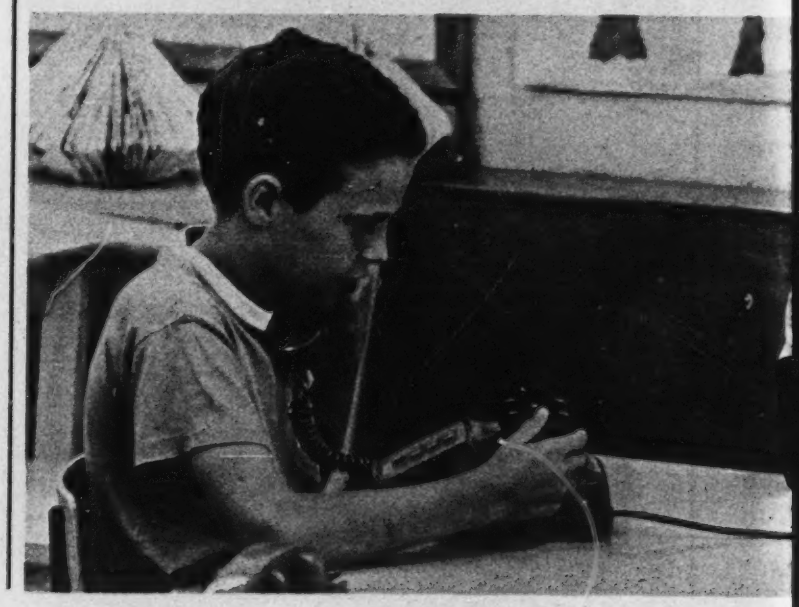
Media: **Slide-tape presentations**

One of the most intriguing aspects of media and technology today is the opportunity they give for student involvement in the learning process. For example, an upper grade elementary school class created a unit contrasting poverty and affluence. They searched through hundreds of magazines to find and clip pictures illustrating or symbolizing these concepts. From hundreds of pictures they edited two groups of 80 each to fit the Kodak carousel projector tray. They taped a narration to accompany the program, including a dubbed—in folk song recording, and using two projectors presented contrasting images — poverty and affluence. Several weeks of work went into the production with the entire class involved. There are literally endless opportunities in elementary and secondary education to utilize in a multiple design, idea-research-organization-presentation pattern. (Henry Ray)

Application: **Deaf students talk to each other more freely with media.**

Media: **Overhead projector**

We give lip service to the development of



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Application: **Deaf students talk to each other more freely with media.**

Media: **Overhead projector**

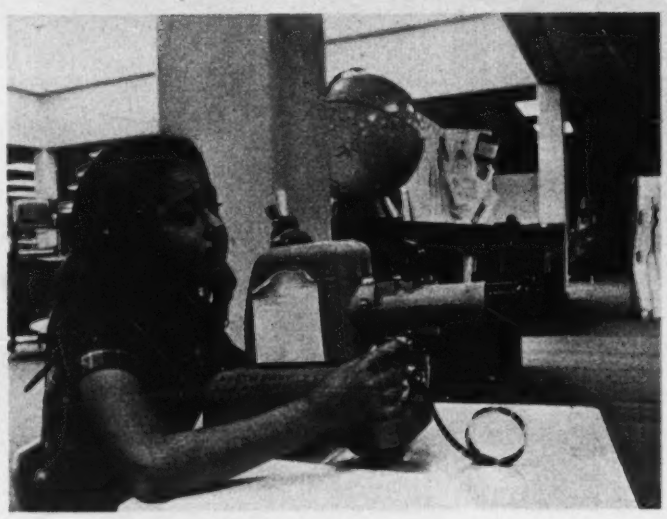
We give lip service to the development of social skills in education, but how many of us, for example, actually make use of the overhead projector to facilitate student-to-student communication? A simple idea for the use of the overhead projector in encouraging such communication is to provide each student with his own transparency material. On this material the student can write his own questions, his responses to questions of others, his comments, or responses to comments made by other students. These individual transparencies can be placed on the projector at the appropriate time. (Hubert Summers)

Application: **Children use cameras to communicate their perceptions of the world.**

Media: **Polaroid cameras**

In the Southwest School for the Deaf at Lawndale, California, a program has been instituted called "camera of the week." In this program a class is given one Polaroid camera plus film per student. Cameras are rotated weekly among classes. Each class chooses a camera project. In a unit on personal care, cameras were carried home for parents to take a series of pictures of their child brushing his teeth, washing his face, and so forth. The pictures were later used as stimulus items in a series of programs on present progressive verb forms involving verbs such as brush, wash, and comb. Students were highly involved in the preparation of the materials and motivation was high. (Hubert Summers)

One teacher in Rockford, Illinois gives a camera to her preschool deaf children. They go home and take pictures of their family members and then come back and discuss the family. Imagine! Five year olds and they have no problems using these cameras! (Ronald Kelly)



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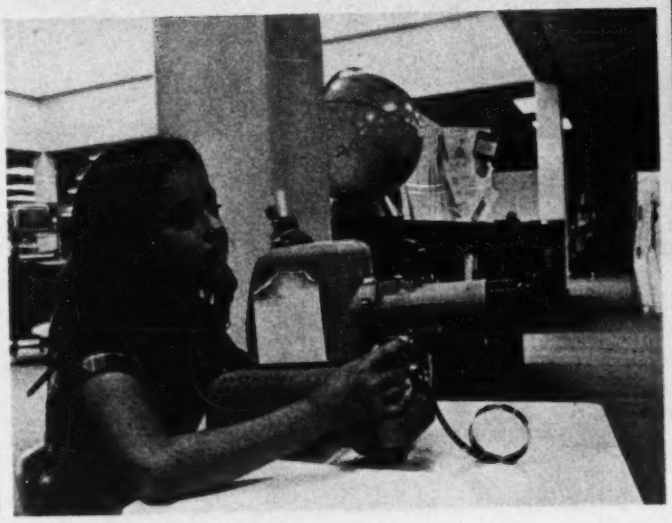
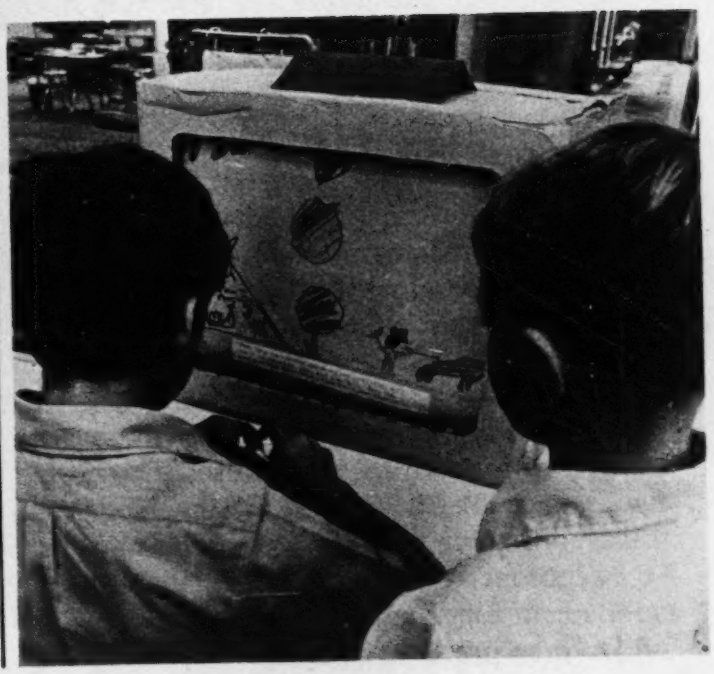
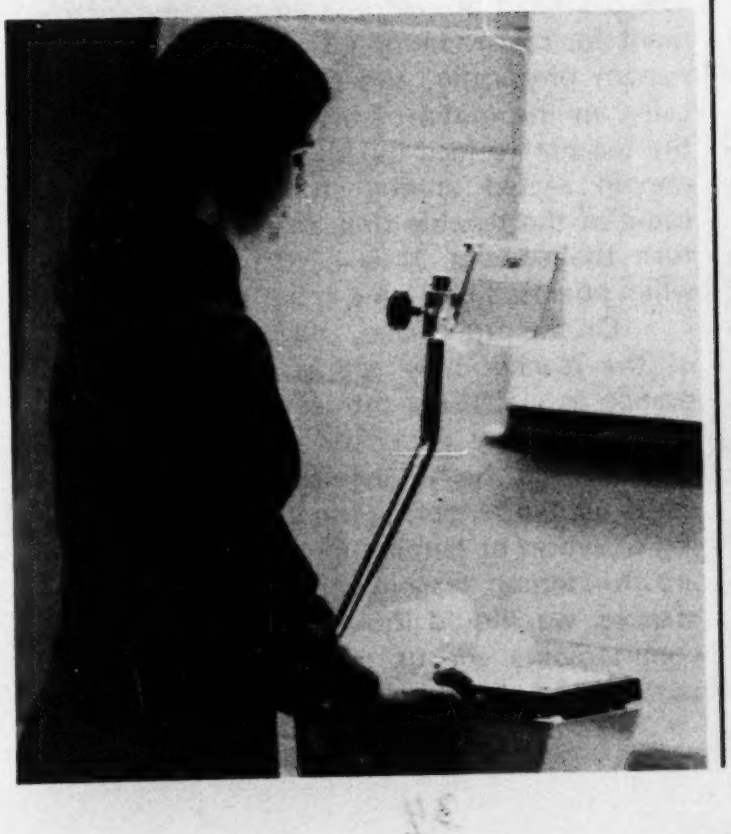




CONCEPT: MEDIA ENHANCE TEACHE



The classroom teacher can use media to increase his effectiveness in communicating with his students. As the teacher stimulates his class with light and color from such channels as the overhead projector, students experience greater involvement in learning. (Lenore Powell)

Application: **Media allows teachers wider latitude for preparing materials to fit needs of students; using community resources.**

Media: **Transparencies and super-8 film clips with synchronized sound**

We wanted to teach students that rhythm was inherent in the environment around them. We wanted them to observe that animals at the zoo had rhythm. We made a series of films on 8mm film and had them mounted in a cartridge so teachers would have no problems getting it into the projector. We took films of animals at the zoo walking — elephants, rhinoceroses, and prairie dogs. We studied the rhythmic pattern, selected music that matched the pattern, and synchronized the music with each animal's gait. Students were motivated to find other examples of rhythm around them. (Ronald Kelly)

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CONCEPT: MEDIA ENHANCE TEACHER COMMUNICATION SKILLS

The classroom teacher can use media to increase his effectiveness in communicating with his students. As the teacher stimulates his class with light and color from such channels as the overhead projector, students experience greater involvement in learning. (Lenore Powell)

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Media: **Transparencies and super-8 film clips with synchronized sound**

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Application: **Media presentations provide a more stimulating environment by adding light, color, easy viewing, and opportunities to involve students actively.**

Media: **Slides and transparencies**

You can do an entire learning series using various media and materials around you. Magazines, for instance, can be a rich source of pictures for stories. You can do a series on people around the world, taken from magazines such as *National Geographic*, or little stories about African animals from *Life* or *Look*. We make these pictures into transparencies which are almost indestructible and easy to use on the overhead projector. The teacher can simply point to an important area of the transparency.

The teacher himself can produce one of the best media for the classroom — slides. Teachers can do their own art work and put this on the slides which are large, lighted, and colorful when projected. A teacher can take postcards and blast them across the screen. With a small postcard, a teacher can only hold it up and ask "Can you see this?"

Slides are a great medium for telling open ended stories. For example, there is a seven slide series designed for deaf children to get them into language experiences — either writing, talking, or telling stories about the slide pictures. The main character is Snoopy, and the slides tell about his getting a letter

and reading it. From Snoopy's actions in the slides, the children are asked to say what was in the letter, who it was from, and why Snoopy reacted as he did.

These very short stories get the children to react. Cartoons in the newspaper can be used and run through a thermofax machine to get a transparency. We took transparencies, cut out cardboard, traced them, and copied them onto a slide. You don't have to be an artist. We now have a series of pictures which can be shown in slides for the children. The child can work individually or in a group with the slide projector.

We can also tell stories. We have a whole clothing series we use for stories. Let's say our character, Bill, is going to a dude ranch for the summer and he has to buy a hat. He enters the store and finds different kinds of hats. We ask the children which hats are worn on dude ranches. They explain which ones are

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We also have master transparencies for a series about parts of the body. We might start with the ear and gradually add parts until we have the head or the whole body. (Ronald Kelly)

Application: **Media enable the teacher to adjust the nature of the interaction between teacher and student.**

Media: **Overhead projector**

The overhead projector is an excellent instrument for classroom use. The teacher is able to remain physically, and therefore psychologically, in the midst of his students. It allows the teacher to face the class at all times or to remain seated among students, eliminating some of the trouble that arises when teachers turn their backs. It is particularly effective when operated in a light, quiet room.

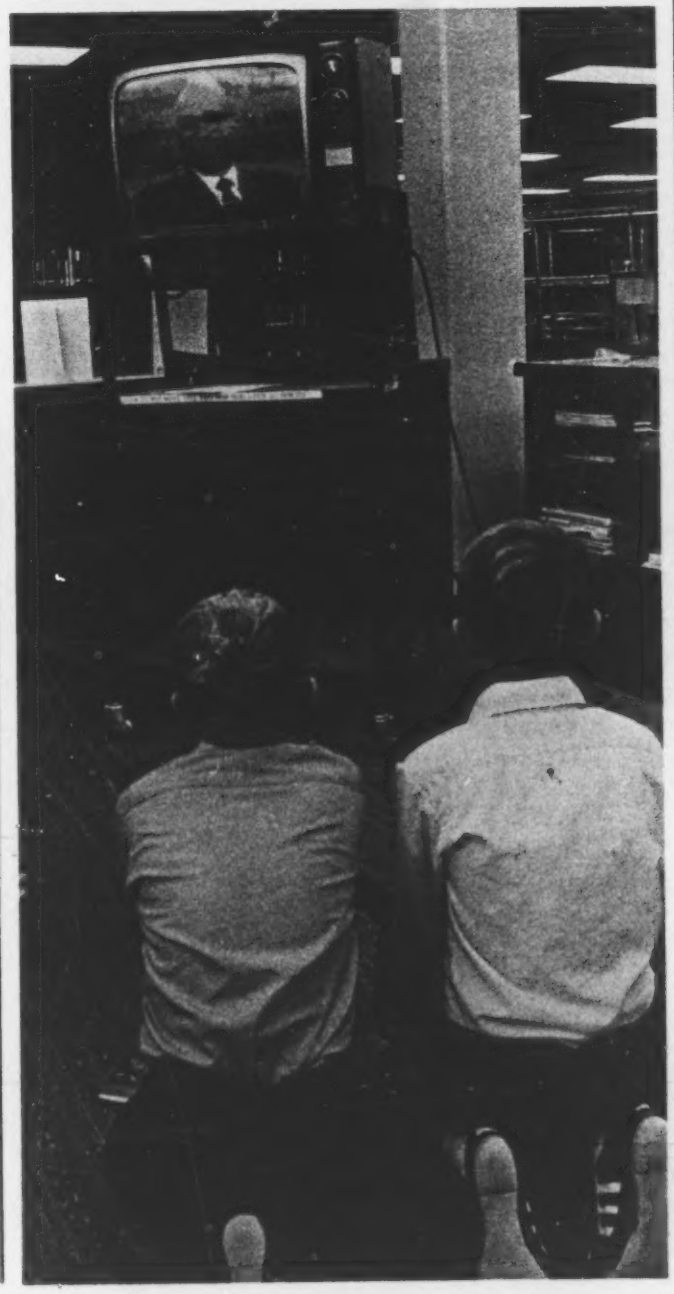
On the other hand, the physical presence of the teacher may act as a barrier or hindrance in classroom interaction. I think it is sometimes very good for us to analyze our own actions, body language, and rapport to see if we are hindering the child in the learning situation or helping him. If we decide we are hindering learning in certain circumstances, we should look to some medium to communicate for us and thus deemphasize our presence. (Lenore Powell)

Application: **Through media the teacher can maintain contact with and monitor individual students throughout the entire learning process.**

Media: **Individual overhead projector; individual television cameras**

The mediated interaction visual response system invented, researched, and developed at the Northeast Regional Media Center for the Deaf is now in the diffusion stage. We have several installations in operation. A number of students are equipped with individual overhead projectors. The teacher can turn on all the projectors at once and observe any individual transparencies the students are preparing. The teacher can determine in the lesson plan what behavior he would like to have the students exhibit in response to his instructions or suggestions. All students then write, spell, select, match, oppose, identify, restate, simplify, analyze, synthesize, solve, diagram, draw, sketch, compose, color, complete, chart, or map as necessary. All responses can be inspected immediately and reinforcement or correction provided instantly.

Another version of a visual response system is presently being researched. It involves individual television cameras focused on students' desks. The teacher has eight small monitors at his desk so that he can observe the desk work of eight students almost simultaneously. We say that the important outcome of education is the modification of behavior. The visual response systems enable teachers to program their teaching so that responses or behavior change is demanded constantly. They then have the opportunity to observe behavior and attempt any desirable modifications of it. Performance can be planned, monitored, assessed, and reinforced. (Raymond Wyman)



CONCEPT: MEDIA ADD NEW DIMENSIONS TO LEARNING AND TEACHING

The classroom teacher, with the help of media, can prepare the learning environment in varied ways. To the students, he can become an almost endless source of interesting information and ideas.

Application: **Media can be used to sharpen students' perception; give them an awareness of perspective.**

Media: **Slides; multimedia packages**

Children who have difficulty in comprehending and dealing with symbols and abstractions need specific types of media. They may have missed many of the concrete experiences necessary for normal development. Equally important, they seem incapable of fully understanding events which have been part of their lives. Educators must aid them in developing the ability to work confidently in the area of symbols and abstractions. They need concrete and simulated experiences with emphasis on the individual. A teacher can use film experiences to fill gaps in the child's real world experience. Pictures are helpful, for example, for the homebound child who cannot visit the zoo. There must be a second object in a picture to give the child a basis for size comparisons. One child looking at two pictures — one of a frog and one of a horse — thought the frog was the same size as the horse. (Lenore Powell)

When doing a story sequence with slides, th teacher can present the images out of focu and have the children guess what the object are from their size, shape, color, and con figuration. When a child guesses an object, th teacher asks why. After he explains, th teacher focuses for him to see if he's correc This technique does a lot to develop percep tion and logical thought.

Teachers can use *National Geographic* t talk about people from *anywhere in th world.* We copy the pictures on transparencie for the overhead and try to give kids ideas o how they would feel if they were somewher else. We put them on top of bridges. We hav them looking down at cities, looking up a buildings. We can put them in San Francisc and ask them if they have ever ridden o trolley cars.

We can teach perspective. A staff mem ber used slides to adapt the children's perspe tive. He helped them to develop an unde standing of their relationship to objec around them. He could put them out on farm or on top of a fire hydrant. (Rona Kelly)

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We can teach perspective. A staff member used slides to adapt the children's perspective. He helped them to develop an understanding of their relationship to objects around them. He could put them out on a farm or on top of a fire hydrant. (Ronald Kelly)

Application: **Multimedia can be used to teach time with a space orientation.**

Media: **Multimedia**

Space perception is involved in telling clock time. The Kentucky Time Instruction by Modular Elements (TIME) program is a self contained kit designed to teach exceptional children to tell time. The kit consists of a clock with removable numbers and hands, worksheets, transparencies, games, and a teacher's manual. The manual includes 10 units from *Learning the Numbers* to *Telling Time Without Numbers.* The entering behavior is determined by a pretest. Each unit is divided into lessons with specific objectives, procedures, and criteria. A reinforcement schedule is suggested for use throughout the program.

The program is modular in two respects. In the instructional program each unit is self contained and may be used alone or with some or all of the other instructional units. Secondly, the material within a unit may be arranged in a variety of ways. We believe that these components are most efficiently used together, but they may be used to reach a desired goal independently of the total program.

The program was developed from a task analysis framework. We determined that we usually tell time from hand position alone and set this goal as our terminal behavior. We tried

to deal with as few concepts as possible. We do not attempt to teach days, weeks, or months; hours in a day; a.m. or p.m.; or even common terms. It is always 11:55, never 5 minutes till 12. This is a rather restricted view of time telling, but our analysis led us to consider such extra concepts as luxuries detrimental to the attainment of our objectives. This is not to say these other concepts are unimportant or cannot be added later. However, every program must set its own limits.

The ordering of the 10 major units chart is not arbitrary. It is only one of many possible sequences. The order may be varied, units may be taught in parallel instead of sequence, or units may be temporarily bypassed if progress is slow.

CHART

Kentucky TIME Program Units

1. Learning the Numbers
2. Positioning Numbers on Clock
3. Long and Short Hand Discrimination
4. Directionality
5. Telling Time by the Hour
6. Five Minute Equivalents of Numbers
7. Reading Minutes by Position
8. Approximating Time
9. Telling Time
10. Telling Time Without Numbers

(John Tringo)

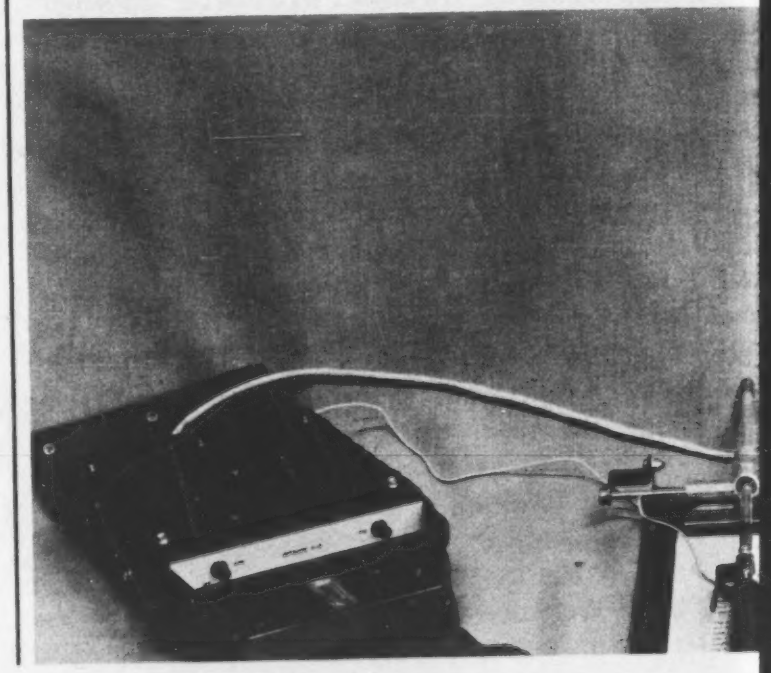
Application: **Blind students read *all* print materials with new equipment. They are no longer confined to braille readers.**

Media: **Optacon Reader**

An electronic device called the Optacon has recently been developed which enables a trained blind person to read ordinary ink print *immediately* and independently in real life situations. The Optacon thus offers an important, practical supplement to braille, disc, and tape recordings by providing immediate access to printed documents not available in these other media.

This device consists of two parts (Figure 1) — a small electronic camera and a larger box that contains a finger sized array of 144 vibratory reeds. The Optacon camera

FIGURE 1



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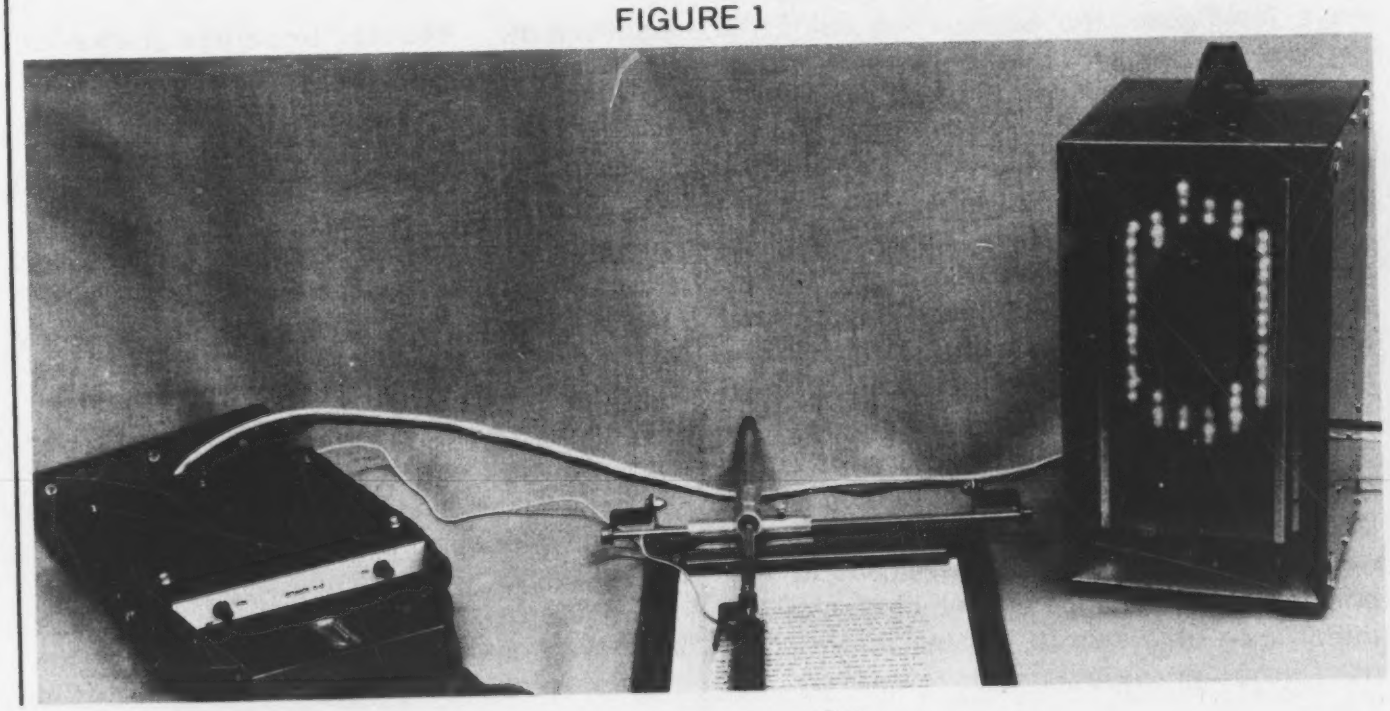
This device consists of two parts (Figure 1) — a small electronic camera and a larger box that contains a finger sized array of 144 vibratory reeds. The Optacon camera generates TV-like electrical signals that represent a 144 point black and white image of an area about the size of a letterspace.

These signals are converted into a vibrating replica of this image. For example, the letter "O" is converted into a tactile form much like a crater with a vibrating rim. Other letters are similarly converted into vibrating replicas. Since the Optacon simply copies the patterns on the page into enlarged but identical vibratory patterns, it can be used with any type style and a great variety of materials.

As the blind person moves the camera over the print with one hand, he senses vibratory images of the letters with a fingertip of the other hand. The tactile stimulator unit consists of a plate with an indented groove for the fingertip. A matrix of holes is cut in the plate with a small rod protruding through each hole. Each rod is individually driven into

FIGURE 1



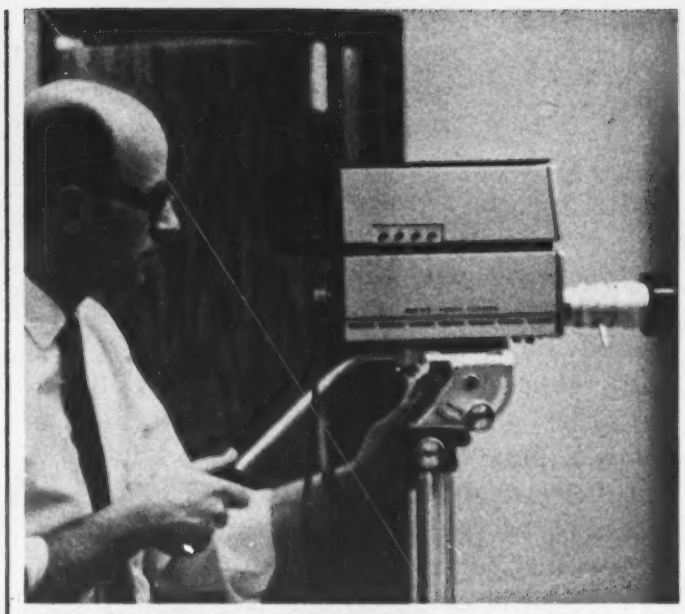
contact with the finger by a reed, evoking a well localized tickling sensation.

The entire Optacon is packaged as a unit in a carrying case about the size of a desk top dictionary. It is powered by a rechargeable battery. Weight has been minimized, and a shoulder strap is included to make the instruments easily portable.

To date 16 blind people have been trained in various ways to read with the Optacon. All have been able to read with it, although their levels of proficiency and amounts of experience have varied. Reading speeds at this time range from 10 to 80 words per minute.

During the last summer another of the blind Stanford students we had taught to read with the Optacon worked with a 29 year old totally blind and deaf person. They worked together for approximately 11 days over a 3 week period for 2 to 4 hours per day. Because the deaf-blind student's speech was not always intelligible and because his ability to perceive the teacher's speech by the vibration method was not perfect, the training sessions posed unique circumstances to the trainer and student. This has been the only time we have worked with a deaf-blind person.

The daily log of the training sessions indicates that this student did exceptionally well in learning the letters of the alphabet and recognizing them in words and sentences. The next step in Optacon reading usually is to go from exercises to reading meaningful text for practice toward the skills necessary for fluent reading. It appeared that the student's own language deficit, resulting from his handicaps, was a hindrance to his achievement at this point. This experience clearly illustrates the importance of access to written information in language development. However, the



student felt the Optacon was useful to him and he continues to use it. (James Bliss)

Application: **Media promote behavior change in children with school adjustment problems.**

Media: **Videotape**

These are some of the ways that we are using closed circuit TV. It has tremendous potential that we're just beginning to tap. In our pilot study, we are taping about a 10 minute segment in one classroom every day. Then the psychologist calls in six children individually from the classroom and has each of them rate his behavior. Each watches only himself during this random 10 minute segment and rates his behavior.

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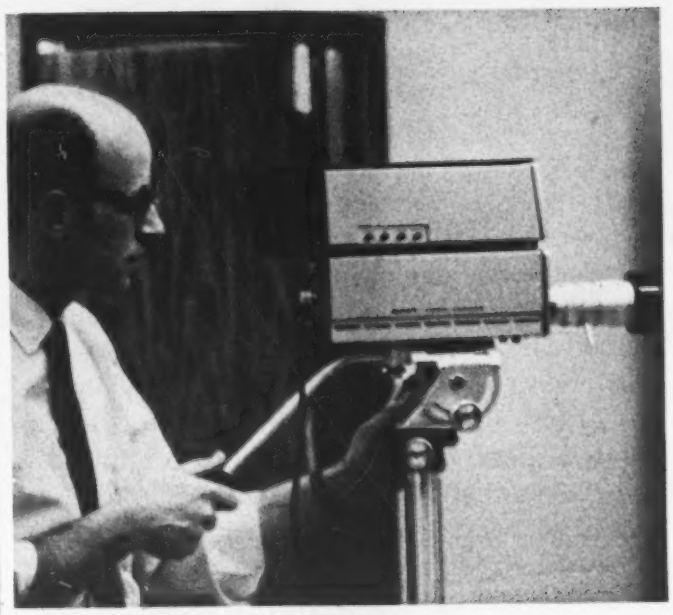

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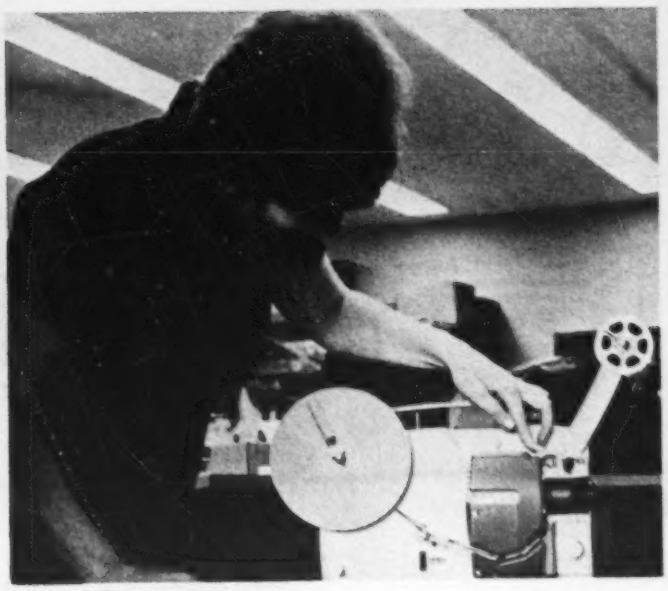
We are starting out with no more than that. We hope to get into more detail as the children become a little more sophisticated in this rating. We're finding an interesting phenomenon. The children are saying, "Oh, yeah, I was okay. Sure it was all right for me to be throwing a paper airplane — the teacher said I could." We understand from other work that has been done in similar areas that for about the first 20 rating periods the child will respond in an absolutely positive way towards himself. Then eventually he is able to confront his inappropriate behavior. It is at this point that we can start to work for improved behavior with the child.

We hope, therefore, to help the child build his own control very definitely from the inside out, rather than our having to impose our controls on him for a long period of time. We don't know yet whether or not it will work. We are interested in finding out. (Jane Courtney, Betty Howell)



Application: **Teacher produced 8mm films can be mounted in cartridges for easy projector loading and use by students.**

Media: **Films**

What kind of film did you use and how did you get it into that cartridge?

Eight millimeter film. It's $2.50 a roll and $2.60 to develop. I put that into the cartridge myself.

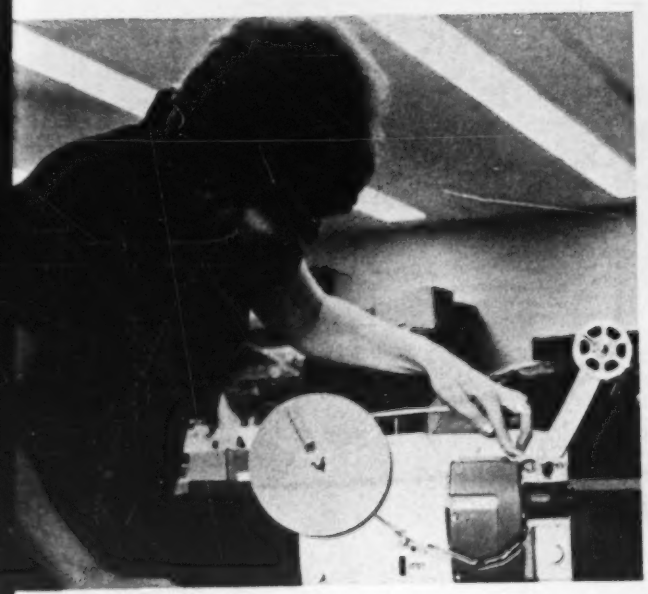
However, you can get it loaded at any developer for $1.00 or $1.50. He'll thread the cartridge for you. I hope that most media centers will do this. If you send us a film, for example, we'll load it for you and charge the cost of the plastic, which is about 75 cents.

What kind of projector do you use then for 8mm cartridge film?

This is a super-8 cartridge projector. There are 8mm projectors for reels. The only thing you have to do is stand the cartridge in it. There are about 10,000 films already on the market that you can buy for from $8 to $15. But it's easy to make your own cartridge for less than $5. Each cartridge will hold 50 feet of film. We edit what we don't want and usually end up with 10 to 20 feet in a cartridge.

It is easy for students to put a cartridge into the projector and replay it continuously. The projector doesn't stop when it reaches the end, but starts all over again. It is good for about 100 plays and then has to be taken out and re-waxed.

The costs of the cartridge projectors vary from $129 to about $200, depending on whether you get zoom lenses or other extra features. A zoom lens is used to magnify



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Application: **Teachers can teach creatively with three-dimensional objects on overhead projectors.**

Media: **Overhead projector**

What materials did you use to make those objects you showed on the overhead?

Just cardboard. Pictures of objects were pasted on cardboard for teachers to cut out. If a teacher doesn't want to use flat objects, three-dimensional objects can be put in the projector to teach math or shapes such as squares and circles. This idea originated with a woman who had a television show in

Illustration by Rita Soucy, CEC

Nebraska, South Dakota, and Iowa to teach new math. Inexpensive plastic pop beads were used on the overhead; in teaching groupings and math she'd pull the beads apart while showing them on the projector.

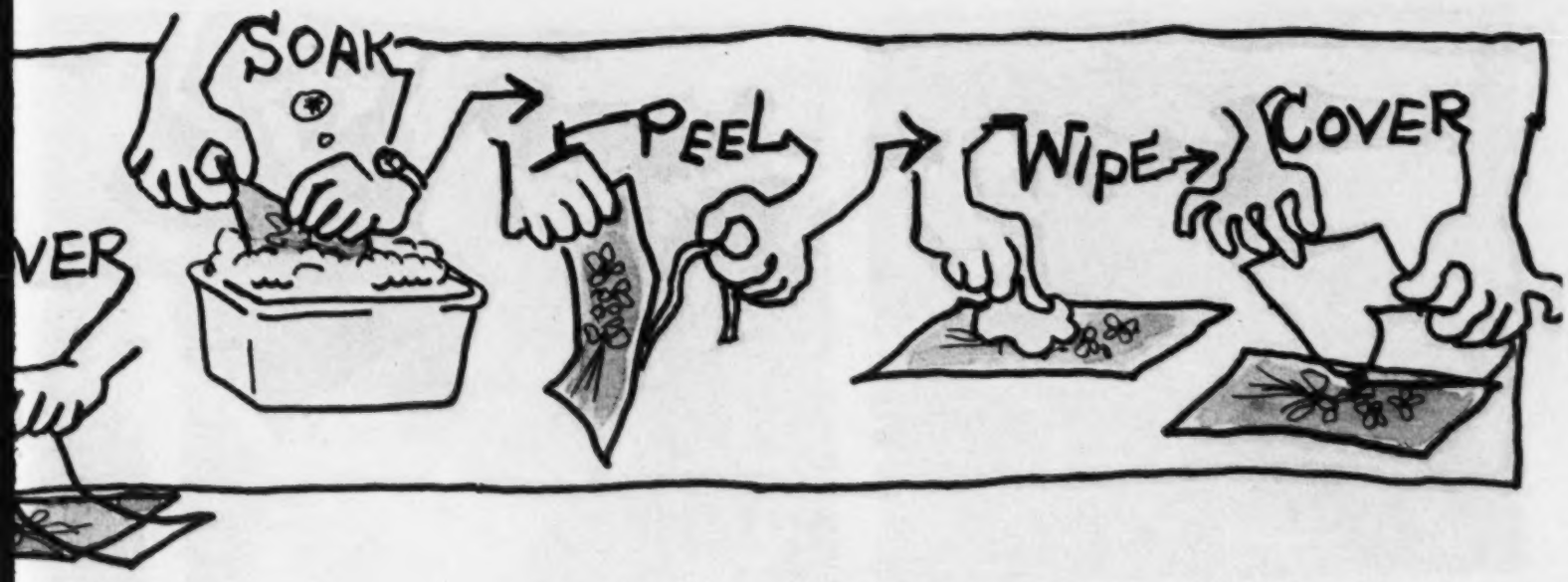
One teacher that I knew from Oak Park, Illinois taught her students about insects the same way. She numbered the insect legs with tags and then she'd remove the legs as she and the kids counted them. She would use a moth and ask how many wings were on an insect. She'd take the moth and pull the wings right off in the overhead.

Application: **Media allow teachers to use materials around them more effectively in the teaching-learning process.**

Media: **Overhead projector**

Can you describe the color lift process used to make transparencies from magazine pictures?

There are four basic steps. First check to see if the magazine picture is printed on clay-coated paper by wetting your finger and rubbing it gently over the picture's border. A gray or milky liquid residue should be left on your finger if the picture is clay-coated. If it isn't clay-coated you probably won't get an acceptable transfer. Now, cut the picture out of the magazine. Cut a piece of chemical-bond laminating plastic film to the size of the picture, and remove the protective backing sheet



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What about the copyright issue?

A general rule of thumb is that copyright problems might result if you sell the product you copied. As long as you use it in the classroom only, I see no problem.

4

The specifics are, according to present copyright law: (a) It is permissible for a teacher to make multiple copies of excerpts from larger works to distribute to the class; and (b) In most cases of print materials it is also permissible to make a single copy of an entire work to show to the class.

Pictures constitute a special case and you must be slightly more careful. Be sure to check to see if a photograph has been copyrighted. If it has, you should not copy it. A copyrighted picture indicates that the photographer considers it to be a whole work of art. Pictures which are not copyrighted are considered part of the total publication. A single picture which is not copyrighted can be considered an excerpt and multiple copies are permitted. Cartoons or comic strips which appear in the newspapers can be copied with no problems.

Application: **Media can be used in learning to elicit certain perceptions which print materials do not.**

Media: **Multimedia Environments**

A few years ago I had an opportunity to help in planning a school. I asked the question, "What could I do with students in this classroom?" I would have a difficult time if I wanted to use visual effects. I would have a very difficult time doing much with body movement. I'd have a very difficult time trying to show kids how light was broken up in a prism and divided into bands. Some of the things that I wanted to provide through nonprint experiences were basic perceptions of visual auditory nature — touch, smell, movement, space, weight, rhythm, and light imagery. I hoped to make these things a focus of learning rather than something that either didn't exist or existed only in a very perfunctory way, such as imagery. Verna Vickery at New Mexico State University talked with me a long time about how kids get turned off from reading. Probably one of the basic reasons is that the words convey no imagery. This relationship between words and image and imagery relationships is a very real teaching problem.

I think another aspect of media is that we have placed most of the emphasis on information retrieval. We have not been concerned about creating perceptual contexts. Often we do not illustrate such things as well known buildings in their true perceptual context. In planning a learning center, one of the things that I wanted to do was to provide a broader conceptual context. To work with self image, you can do a little bit through reading but

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Media: **Multimedia Environments**

A few years ago I had an opportunity to help in planning a school. I asked the question, "What could I do with students in this classroom?" I would have a difficult time if I wanted to use visual effects. I would have a very difficult time doing much with body movement. I'd have a very difficult time trying to show kids how light was broken up in a prism and divided into bands. Some of the things that I wanted to provide through nonprint experiences were basic perceptions of visual auditory nature — touch, smell, movement, space, weight, rhythm, and light imagery. I hoped to make these things a focus of learning rather than something that either didn't exist or existed only in a very perfunctory way, such as imagery. Verna Vickery at New Mexico State University talked with me a long time about how kids get turned off from reading. Probably one of the basic reasons is that the words convey no imagery. This relationship between words and image and imagery relationships is a very real teaching problem.

I think another aspect of media is that we have placed most of the emphasis on information retrieval. We have not been concerned about creating perceptual contexts. Often we do not illustrate such things as well known buildings in their true perceptual context. In planning a learning center, one of the things that I wanted to do was to provide a broader conceptual context. To work with self image, you can do a little bit through reading but you can't do very much. Self image shapes behavior. Therefore we should design experiences so that the kid begins to see himself in relation to society and his own peers and sees himself as an important person. Then changes can take place in him.

Media can provide behavior models for self actualization as well as for social behavior. We had a problem in our groups of mentally retarded children. They had lots of toys, but they did not know how to play with them. So we made some loop films, and the kids saw other kids playing with the toys. Thus they learned to play with toys. We can use a great deal of this kind of thing. Movement and rhythm also provide learning experience. Certainly, awareness and insight are two of the biggest needs in American society. We don't have a culture that is aware. I think there is a great deal of concern today about intellectual expansion and learning with feeling. I've heard people question whether or not we should try to raise the abilities of the children, particularly retarded children. I'd like to give them a chance anyway. (Henry Ray)

CONCEPT: MEDIA MAKE INDIVIDUALIZED INSTRUCTION A REALITY

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ZED INSTRUCTION A REALITY

Many children work very hard and still "fail" continuously in the eyes of their teacher. They do not perform because the tasks assigned to them are inappropriate in terms of the skills which they possess. As a result we tend to label students successes or failures.

Individual attention is not the solution. We give children a great deal of individual attention. We often show a child how to do the same problem a number of times, and he still does not get it right. The reason for this is our failure to differentiate between *individualized instruction* and *individual attention.*

Let me use the model of the typical classroom. It's built around a distribution system of percent correct. A teacher takes 10 problems and gives them to all the kids in the class. Some get a zero, some get 25 percent, some get 50 percent, some get 75 percent, and some get 100 percent. This is the way a typical classroom operates. This distribution system (percent correct) negates the effect of individualized instruction in the typical classroom. As long as we use this model, the reason for failure is apparent to teachers: the child is to blame. One of the first steps we have to take in adaptive education is to eliminate the whole idea of distributing scores over a group of kids and labeling as failures those performing at the lower end of the distribution of scores.

The tragedy is that the kids who are at the bottom stay at the bottom. A kid always gets zero percent or 25 percent. When grades are averaged, he gets about 20 percent or "F."

He receives "F" as a preschooler, as a first grader, as a second grader, and so on. By the time he reaches the fourth grade he is a pretty unhappy character, and he doesn't like his school. Moreover, this student's image of himself and his abilities to perform in any area — even outside of school — become increasingly negative. (John Cawley)

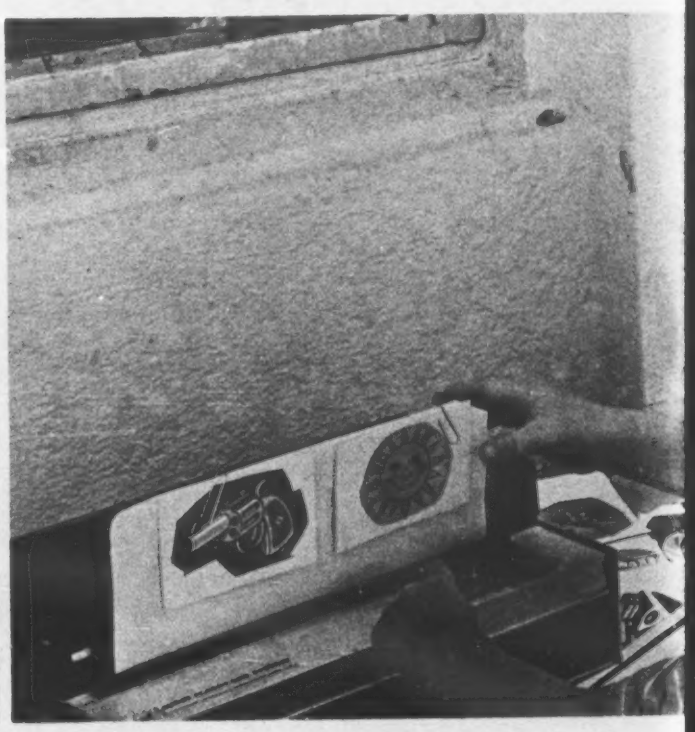
Application: **Experimental computer programs demonstrate how students can work at their own pace and not be labeled failures; an excellent example, a computer program of 17,000 lessons to provide arithmetic programs for slow learners ages 4 to 18.**

Media: **Computer Assisted Instruction and adaptive education**

Adaptive education is the goal; Computer Assisted Instruction seems to be the best way to get there at the moment. The idea is that no learner should stop short of his ultimate achievement because of idiosyncratic difficulties in his study strategies. The decision making demands and the stimulus-response situations necessary for adaptive education seem to be met best by the capabilities of the modern digital computer. (Harold Mitzel)

We have a 5 year grant to develop math programs for the slow learner or mentally handicapped youngster. We are building a total program which includes over 17,000 lessons that can take a child through math from approximately 4 to 18 years of age. The beginning program is essentially multilingual: you can use it in any language. All you need is either recorded cassettes or a teacher who speaks the language. Not all the children in the room need to speak the same language to provide the teacher with feedback.

As the program is laid out, seven areas of patterns and geometry are covered plus three sections of sets (fractions, measurements). The program covers approximately 1,000 to 1,200 days of school of the 2,500-2,600 days a student will spend in school. Every child in the room can be doing a different number of problems, combination of problems, or a different array of problems at different levels at different times, faster than you could give 10 kids 10 problems or the same 10 problems to all 20 kids in your room. (John Cawley)



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Planning for Change

"The focus of the responsibility
also is shifted and lies with developing
good learning packages and strategies.
Failure rests with the
educational program and the system and
not on the small shoulders of the child."

Edward A. Martin

PLANNING INSTRUCTIONAL SYSTEMS

Planning is the dynamic key to good programs. Participants shared planning ideas, problems, and suggestions for instructional systems, material development, delivery systems, and teacher support in the use of media.

There is an important sequence of steps to follow in planning an instructional system and many factors to be considered.

First you must analyze the objectives. Second you must design a system which will accomplish those objectives. Third you must implement the system.

The most important task to be completed in establishing objectives is to clarify needs the system will meet and to determine a purpose. The objectives which will meet these needs and purposes should then be defined in terms of behavioral objectives. You need to keep in mind that any system is part of a larger one. An instructional program or instructional system for handicapped children operates in conjunction with and in the context of a regular educational system. In planning our instructional system we cannot completely diverge from the basic premises that the larger system provides for us.

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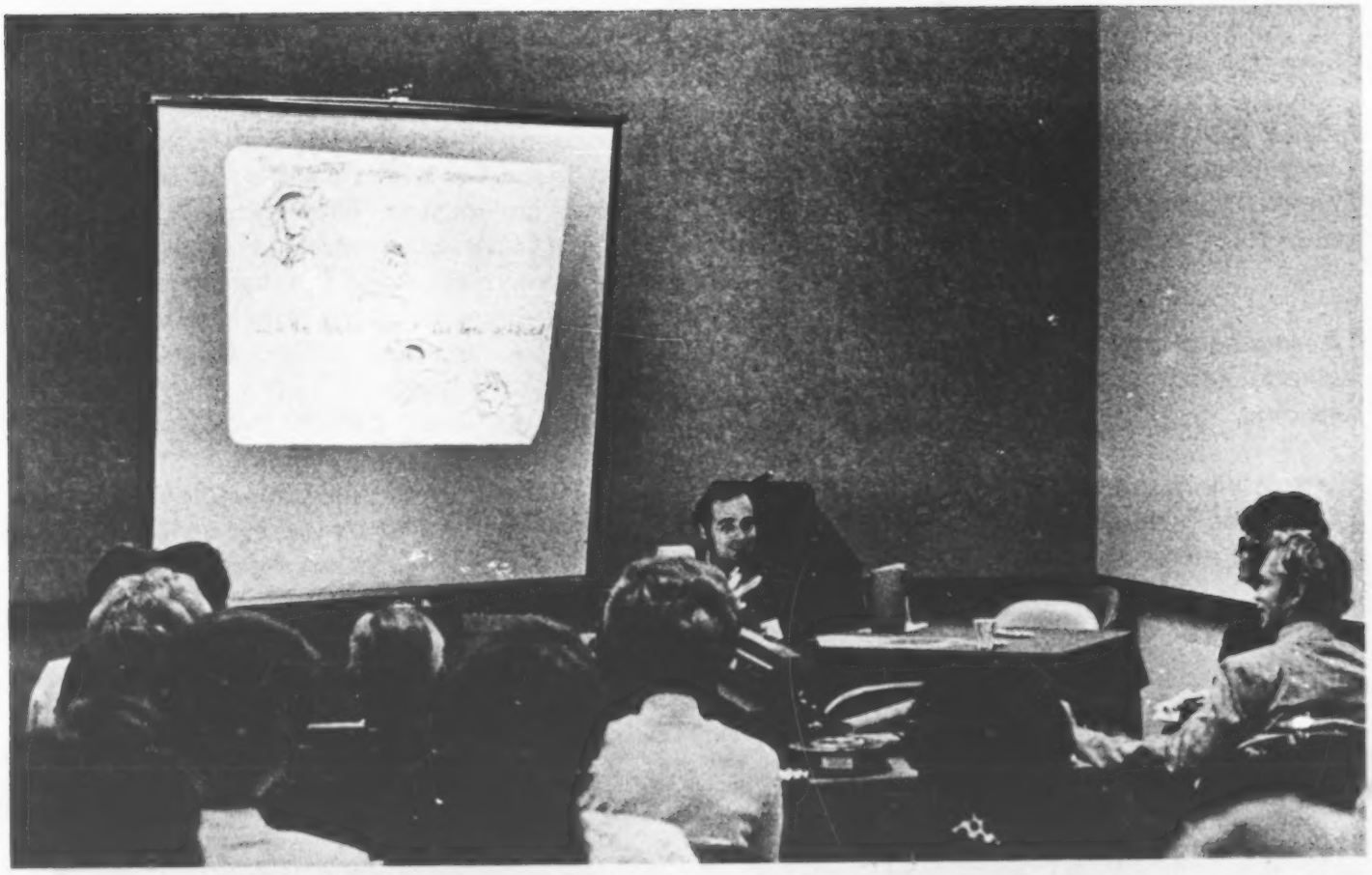
Once the behavioral objectives are stated it is necessary to determine what functions have to be performed by the components in the system. There may be components such as instruction, placement, guidance, support, and evaluation or feedback. The feedback component is very important. It is a way of providing data to the instructor or teacher for decisions. We must bear in mind that data must also go to the learner so that he is aware of the changes which he needs to make.

Another level of analysis of the components of an instructional system is the organization plan. If our system includes, for example, a superintendent, a director, a media lab, and a diagnostic center, it is necessary to show how these are related operationally and administratively.

These are some of the factors which need to be considered in planning and designing an instructional system. (Robert McIntyre)

In our summer institutes, attended each year by approximately 45 teachers and supervising teachers of the deaf, we undoubtedly have our best opportunity to influence and train teachers for a systematic approach to instruction. In these institutes, participants work through the process of identifying an instructional need; specifying purposes, goals, and objectives; conducting analyses of learning



tasks involved to accomplish the objectives; designing instructional strategies; developing instructional material of a self instructional nature; and designing a method of evaluating the materials in terms of the stated objectives. In these institutes we make a special attempt to see that the participant is capable of generalizing the principles for a broader context. (Hubert Summers)

Classroom designs should include plans for equipment.

Ray Wyman emphasized a point that I hadn't given any thought. In his presentation he mentioned that he hoped all equipment became so heavy that it couldn't be removed from the classroom. I had been asking for lighter equipment so that women could carry it from one place to another. He said that a piece of equipment is not really used until it becomes stationary in the classroom. When the teacher has to move a chalkboard, has to bring it in, set it up, find the chalk or the eraser, she isn't going to use it as often. School boards and school districts must make these materials permanent parts of every classroom. How many of you used a flannel board when you had to get the pieces out and put the flannel up on the board? It's not nearly as

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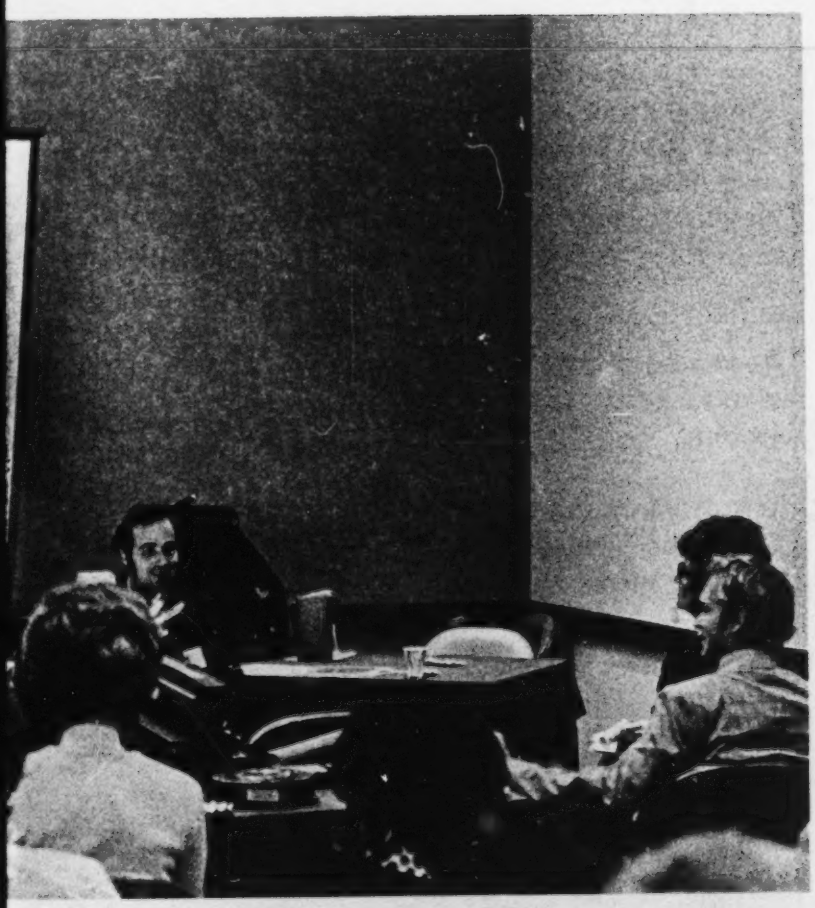

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A classroom which simulates a total environment can be planned and implemented.

We designed a combination planetarium/ science center with an area for humanities, arts, and perceptual training.

We have a round room and can project images using slides. I have a camera with which I can photograph virtually all the visual environment that we need. With four slide projectors we can surround a child with a

forest, a desert, Times Square, or anything. You've got lots of environments available from which to choose. It costs us only about $2,000 for a 360 slide projector with 60 degree projection. My camera was a couple of hundred dollars. My time for shooting these things wasn't included. But for a very low cost, we have created 360 degree environments. We have a climate controlled room which quickly can be made extremely cold or hot. In this room we then project a forest. We have a sound system so that we can have a bird singing in the tree. The kid sits down and identifies where that bird is by its sound wave relationship to him. It is beautiful to watch the kids trying to tune their ears and their radar to find the bird. Some kids really think they see the thing. Through the manipulation of sound, we can have the bird fly in a circle. People automatically turn their heads and look for it. Even adults with their sophisticated, educated ways look for the bird. You can't resist it.

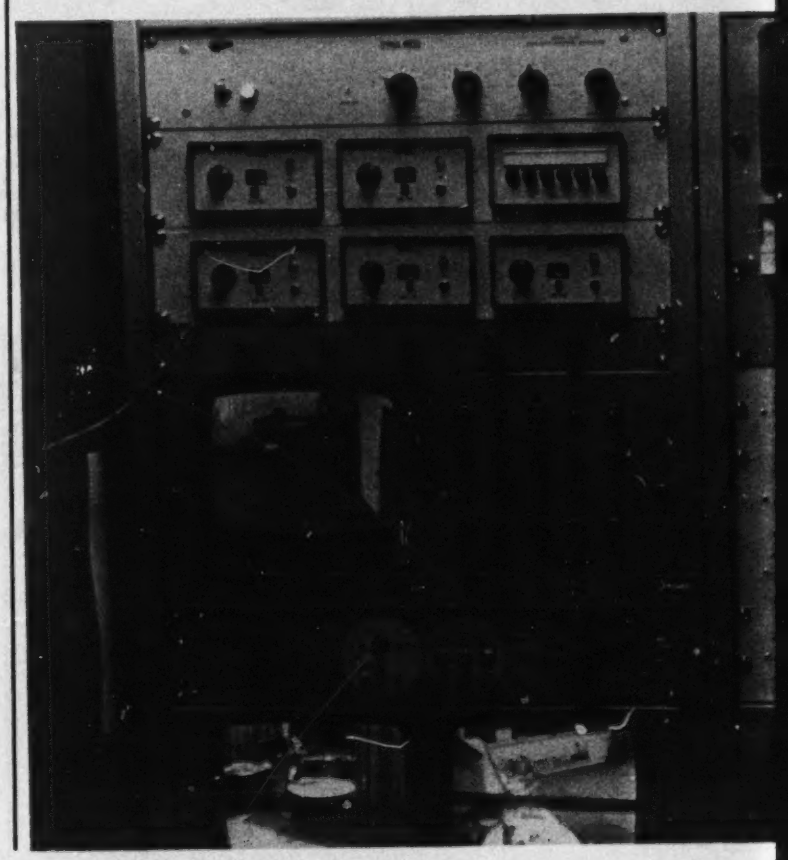
We can project a city. I took a shot of Philadelphia, getting the full panorama of the city from an airplane. We can add the sound of a siren or a street cleaner.

Since we have no furniture in the way, we can do things with our bodies. We can move around and not be concerned with bumping into a chair or a desk. We can do things with light. This is the most exciting effect. We can work with color. We have a planetarium instrument which is stored in a pit completely under the floor, out of the way and out of sight. It doesn't interfere with what I want to do. I don't know anything about astronomy. I have a specialist who runs the planetarium. We have a $150,000 instrument that sinks down into the floor.

The technology really isn't complicated here. We have four slide projectors spaced up above so that we can create an image that is about 90-100 feet long. The image is almost a wrap around, like Cinerama. We use ordinary Kodachrome slides. A great deal of imagery is important for all these projections. (Henry Ray)

A special school in Florida planned to meet several needs through the use of one media system.

The same media within a single system can be applied to a whole range of problems once the schools' needs have been assessed. There are



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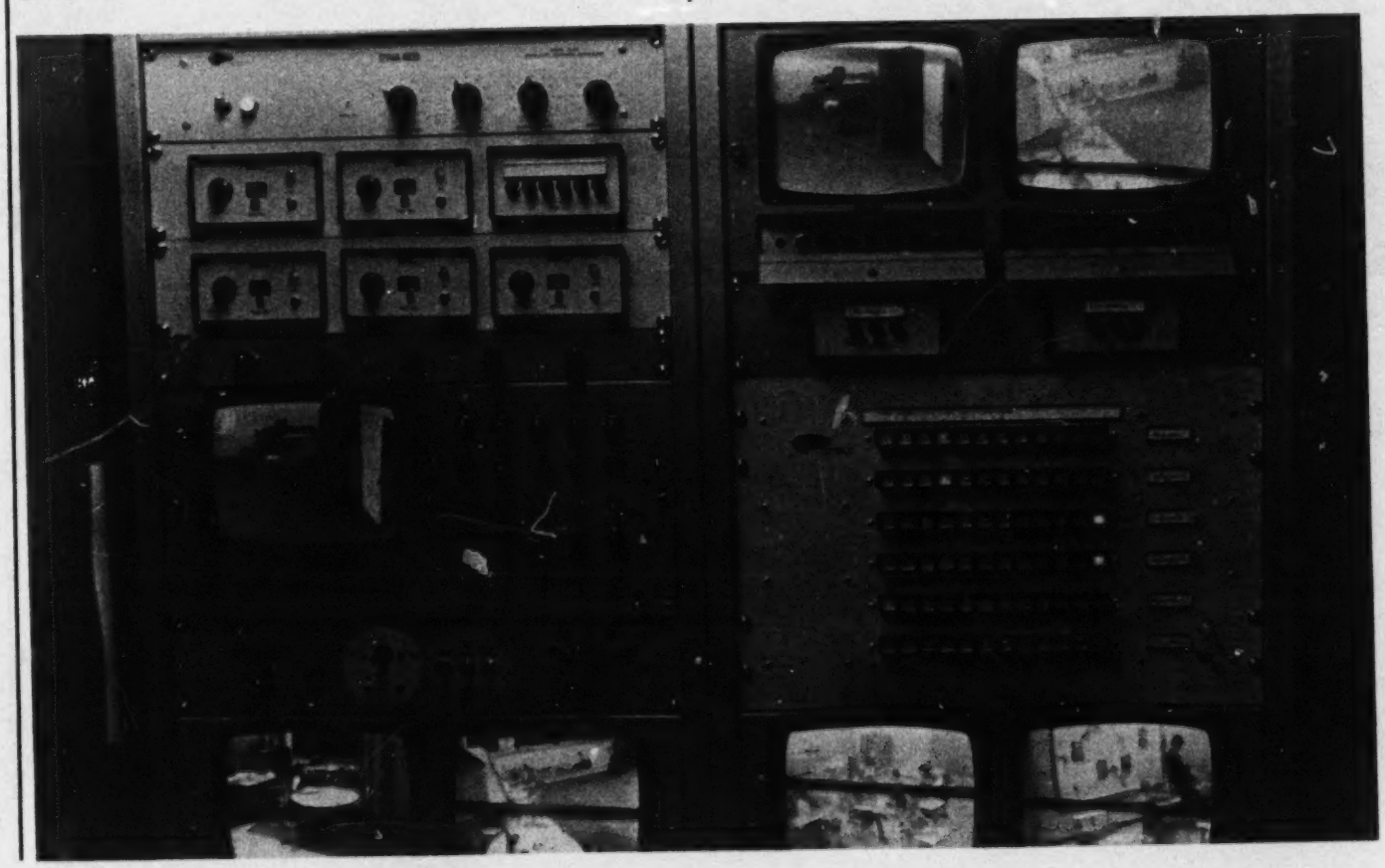
We use closed circuit television at the Gateway School to observe a child for longitudinal studies from the time he comes into the school. If we feel that this is a child about whom we want to do an in-depth study, we



can tape him during the 3 day observation period. We can continue to pick up taped bits on this youngster over the entire period he is in the Gateway School, which we hope will be no more than 2 or 3 years. Then we hope to get him back into his regular school. Gateway is a public school, but it is a school for children with educational handicaps.

There are many purposes for this longitudinal study. Of course we are interested in studying a child's behavioral changes and his academic and social growth. These results can be helpful to the teacher in the school to which the child will return. She can come in and see what this child was when he started at Gateway, how we handled him, and what his behavior is now. Perhaps we can assist her in finding the best method of handling the child. We also help our own teachers in planning objective observation methods. Looking at the tape of the interaction with a particular child, they can become far more objective and see what can be done to strengthen their approach to the child.

We also use the tape in parent conferences. This is done in a number of ways. In some cases we want to illustrate the child's good behavior at school. The mother will say that he is a hellion, he never does anything right around the house. We can show her the way we are handling him and the way he is reacting. Then we can try to work together. Of course, the reverse can also be true. We tell a parent his child was really bad and he doesn't believe it. We can use the tape to illustrate the point. One picture is worth a thousand words.

Often we have over 100 visitors. Again the closed circuit TV is tremendously helpful, because we don't want people casually walking into the classrooms, particularly where there are neurologically impaired children. This changes the whole milieu in which the child is working and makes it more difficult. If they walk into the classroom, they are immediately a disruptive factor. We allow them to "live-view" the five areas where the cameras are located. This way they can see how the children are really acting and interacting with each other and with their teacher.

We are also trying to do some editing and dubbing of tape. This is one of our problems, because it is often time consuming and technically difficult. We have both half-inch Sony and one inch Ampex equipment. Segments on one child might be on 10 to 20 different tapes, and of course our eventual goal in some cases will be to combine these into a single tape picture. We hope to make tapes which will be of sufficient quality to disseminate throughout the country. So far we have had several requests for the tapes on the behavior of the emotionally disturbed child, on behavior modification, and on various aspects of our teaching and training programs. (Jane Courtney, Betty Howe)

What are the comparative costs between closed circuit TV and the utilization of other audiovisual techniques to record behavior of educationally handicapped in your school?

For our purposes closed circuit TV was less expensive. We were very fortunate in receiving a government grant which installed the closed circuit TV system. This was renewed over several years, and we now have about $35,000 worth of equipment in the school. Tapes are the one area in which we do benefit

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A large city school district has compiled a range of media from which to choose to solve unique problems in delivering quality education to the homebound.

In New York City there are approximately 3,000 homebound children on register at any one time. A program is provided for those children who are so severely physically or emotionally handicapped that they are unable to function in a regular school situation.

FM Radio. Essentially our first experience in media was this FM radio broadcast directed to high school students. It covers a range of high school subjects and has been in existence now for some 20 years. In this program the

students listen to 20 minute broadcasts on high school subjects, 4 times a week. This is supplemented by the home teacher who visits 3 to 5 hours a week, depending upon the travel time and the number of the pupils assigned to her. Rather than a specific lecture approach to instruction, the broadcast originates from a public high school where six students constitute a small discussion group or class with the radio teacher. The child vicariously experiences group interaction.

AM Radio, ETV. Actually our problem is that we're trying to reach a large number of students without having to install special equipment in the home because we have a large turnover. If a youngster does well after a fracture, for example, he will be back in school in 3 months. The process of getting equipment out to the home and getting it back is both cumbersome and costly. It simply can't be done or hasn't been done in New York City at this point. It might be a little easier in smaller cities. We have an educational TV channel that is excellent. There are a wide variety of programs running, from prekindergarten through high school, but they are on UHF. Most of the kids on home instruction can't get these programs. If this kind of instruction ever went on regular broadcast channels, either AM radio or regular TV, it would change the whole character of education for the homebound.

Cable Antenna Television. A second speaker offered this suggestion: We're using cable TV in our area. We're negotiating with a local cable company to have our own channel originating from the university campus. We'll start with one channel from our studios. Total construction costs will be approximately $7,000. We'll have no maintenance costs whatsoever, because the cable company will maintain the lines once they are in. We pay their cost of construction. For $7,000 we could supply almost 80 percent of our community with cable

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The big problem that we have with educational television, either VHF or UHF, is the cost. Also we are limited to one channel, whereas with a cable system we can have several channels for the cost of one UHF or VHF channel. This year we will have only a single channel, but if it goes the way we hope, we think we can broadcast up to three channels. We're using the new "J" format ½ inch and we've distributed cable over 80 percent of our area. The town is fairly spread out, and yet we haven't had any significant signal loss. This is the inexpensive ½ inch equipment. It is very good quality-wise. So if cable TV systems come into your area, I think you'll find the economics tremendously advantageous as compared to broadcast television.

Teleclass. The second medium that we've begun to use seems to be the best total medium.

it is the unit that we call teleclass. This is a group conference phone device with 20 attachments. It means the teacher is able to contact 19 students and conduct a regular class with those 19 students in a group conference approach.

There is also the possibility of teaching a foreign language over the phone. The youngster could hook into it and listen to the language lab with a group of students.

Participants asked questions about teleclass: How expensive was this teleclass and how effectively was it used?

The teleclass is, first, quite inexpensive. There is an initial installation fee. The cost for the year, without the cost of a teacher, was approximately $7,000, which in some cases included installation of phones for kids who didn't have one. Essentially the teacher sits at the telephone device and conducts a small class over the telephone. Teleclasses have been held in biology, English, and social studies for the past three years. Last year we added foreign language instruction. The teacher had 14 high school youngsters taking second year Spanish and second year French. He spoke with each of them in groups of six and eight 4 times a week. There were eight students in the Spanish class and six in French. He visited each home once a week. The combination was incredible. He was able to maintain daily contact with them and visit them personally about once a week. Ordinarily he could only visit them at home once or twice a week. We are trying to simulate a regular class. The Bureau of Foreign Languages indicated these students did as well in teleclass and on the standardized city wide exams as they would have had they been in school.

Did you support this with textbooks and audiovisual materials for the individuals?

They were given regular courses of study. We gave them a set of books and workbooks and the teacher worked with them individually and over the phone.

Computer Assisted Instruction via telephone. A significant instructional device that we have begun to think of in terms of its possibilites is "Dial-A-Drill." Essentially this is computer assisted instruction (CAI) through a home phone. It is part of a Federal grant through which touchtone phones were given to children in different districts in the city. The students were able to take a math drill 3 times a week for 5 minutes. It was just a beginning in CAI for home instruction. Students were able to dial the computer directly. The computer picked them up at their individual performance levels and proceeded with the next sequence of questions. They were able to respond over the touchtone phone. We discontinued participation in this program for the current year primarily because the costs and logistics of it were not worth the results, but there is no question of the latent potential of this medium for home instruction.

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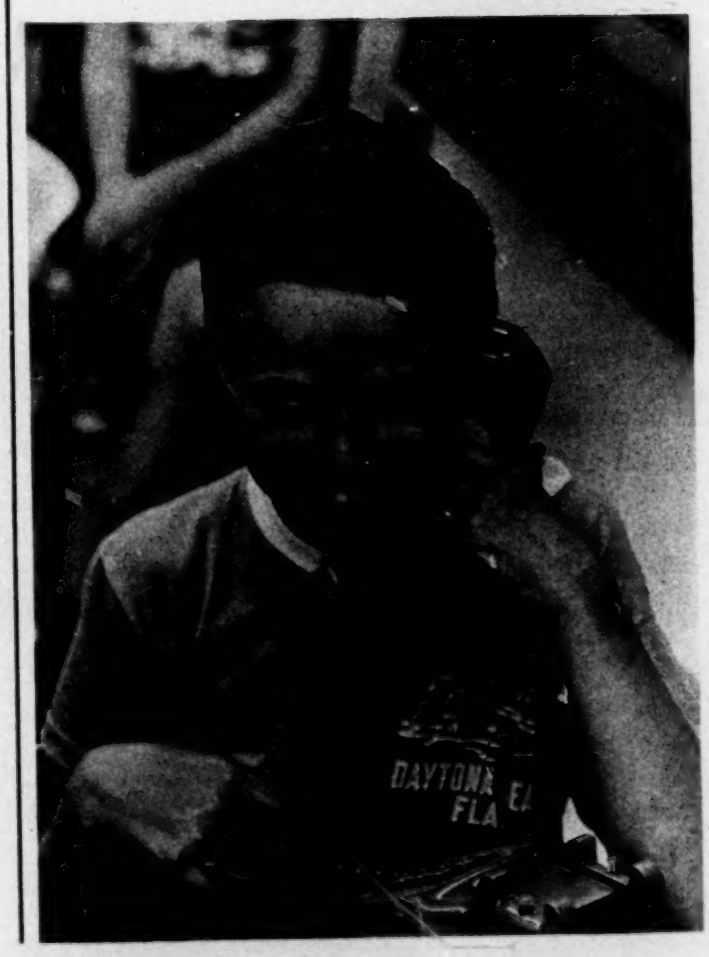


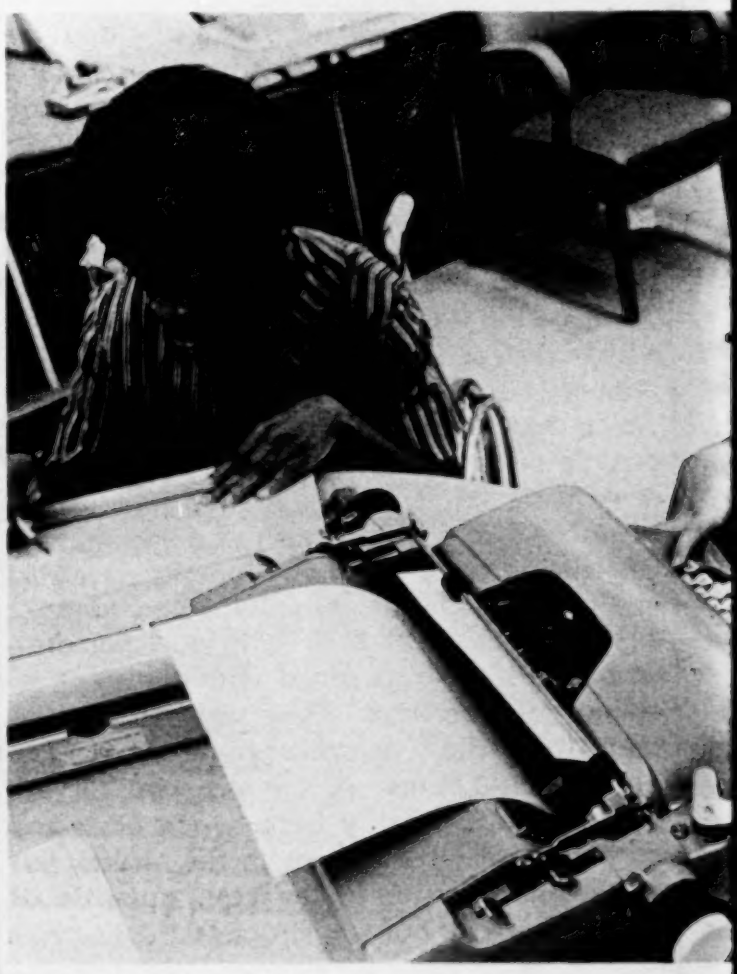
I have a question about CAI through the home phone. You mentioned special devices, and I gather what that means is a special hook-up.

It is simply a regular touchtone telephone. In other words, most of the families in New York City don't have the touchtone device. We have to install them, but that is the only equipment needed.

What kind of response do they get from the computer through the telephone?

They get an audio response, a question. The student at home touchtones his answer to the computer, then gets a response over the phone. In a 5 minute period there may be as many as 20 questions asked by the computer.

Mobile Training Van. Another medium is a mobile training unit. Generally, homebound students do not receive any vocational training as they would in a regular school program. We've just submitted a proposal for a Federal grant for a mobile van with an industrial arts teacher able to take needed vocational education experiences to the student. We decided on the printing area as one that would offer the most opportunity for employment in New York City. The mobile unit will cover printing services from typing to mimeo to photo offset and printing forms. So this range of printing services will possibly enable those youngsters who are ultimately able to get out of their homes to obtain employment. A second unit is planned that would be set up for those youngsters who will be homebound as adults. There is currently no real program for these youngsters. This unit will enable the teacher to bring the materials up to the home and work with the homebound children in the preparation of the kinds of skills that they might eventually use vocationally from their homes. (Meyer Lieman)



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A brief view of important factors to be considered in planning an instructional resource center.

Approximately what is the budget for your instructional resource center and how is it distributed?

It varies. Our entire center including personnel salaries, equipment, and materials is funded through Federal Title I money. The Texas Education Agency distributes this for the entire state, and the programs for the handicapped receive about 13-15 percent off the top. We felt the best way to use our share was to set up an instructional materials center. At the present time, to continue as we are without expansion since we already have all our equipment, our budget counting salaries would be about $35,000-40,000 yearly. That includes everything but initial equipment cost. The hardware or initial equipment is primarily production hardware. We in the area of education of the deaf have been quite fortunate. The Media Services and Films for the Deaf, with the Bureau of Education for the Handicapped, US Office of Education, embarked on a program several years back to provide overhead projectors on permanent loan for every classroom for the deaf in the United States. They bought them in lots of thousands and distributed them. So we have been quite fortunate in not having to spend a great deal of money for classroom equipment.

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The majority of our expenditures has been for production.

How do you file the description of materials in the index? How do you describe the materials in the catalogue for the teacher?

At this time these are filed according to educational levels: primary, elementary, and such. We also catagorize them by type of material, e.g. bird pictures or preposition pictures or nouns and type of nouns. We are currently in the process of trying to develop an improved catalogue system. We want to set up some general content categories with multimedia lists of all materials available for that particular content area. For example, take the topic "farms." We want to have a central file for each content area in which "farm" can be looked up. On that card will be listed 16mm and 8mm movies, pictures, transparencies, film strips, and slides that we have.

Does someone in the center help the teacher select materials?

This is where our consultation function comes in. We talk with the teachers not only to find out what thay want but to find out how they are going to use it. If something will be used only once, why make an elaborate deal of it? Let's make a simple office-copier

transparency that costs 15 cents. If it is something that will have continuing usability, that other people would be interested in using, and that will be essential the following year, then we spend more time and money on it.

We have found that media personnel must be readily available to teachers. Even more important, they must take an active role in this relationship. We cannot have media people sitting back and waiting for somebody to come and contact them. They have to take an active role and go out and make contacts with the teachers.

An instructional resource center should consider its school system's characteristics and capabilities in selecting a storage and retrieval system.

Even with a prescribed curriculum, we are still faced with the task of gaining access to available technologies. While complex procedures are available and can be employed to retrieve media, there are practical limitations which inhibit the implementation of some of these systems. Some schools are not ready for them, and the complex systems used in business do not exactly meet the needs of schools. It becomes imperative that public schools begin with retrieval systems which are workable and within the present capabilities of the district. This means we need to develop systems unique to education. (Edward Meyen)

PMRS is an example of one new catalogue system being planned and developed to meet the needs of teachers of the handicapped.

Many teachers have developed a skill for diagnosing a student's problem. These teachers encounter difficulty when they attempt to get materials from the Resource Center. The materials generally are not categorized according to diagnostic terminology. Even if one has a large holding of educational materials, the teacher still has to make appropriate selections. The hunt is time consuming and often a waste of professional energy. Educational programs across the country have children sitting

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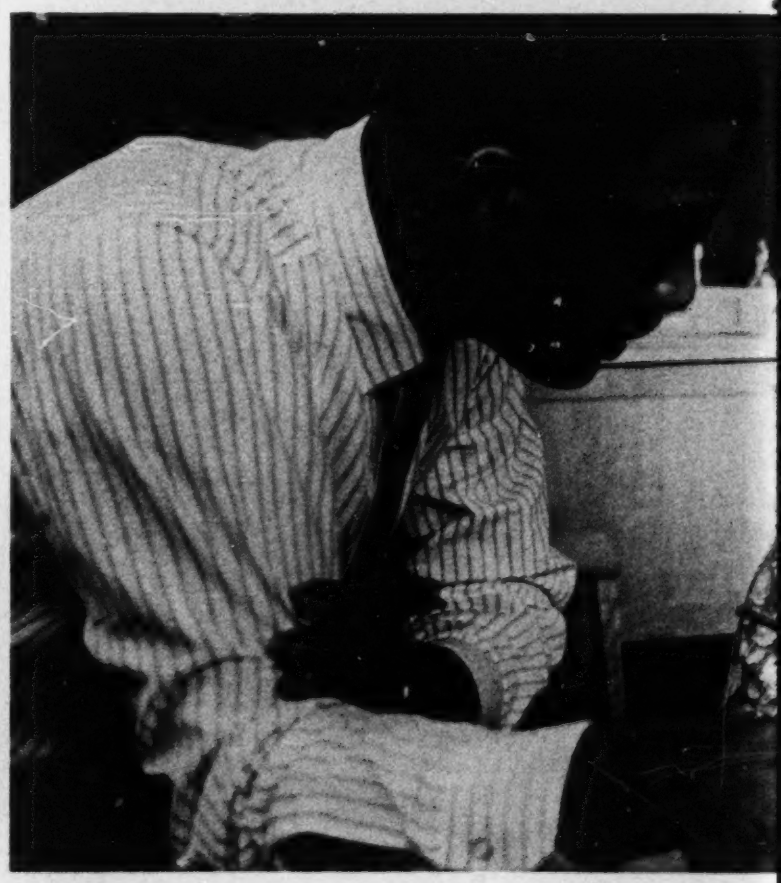

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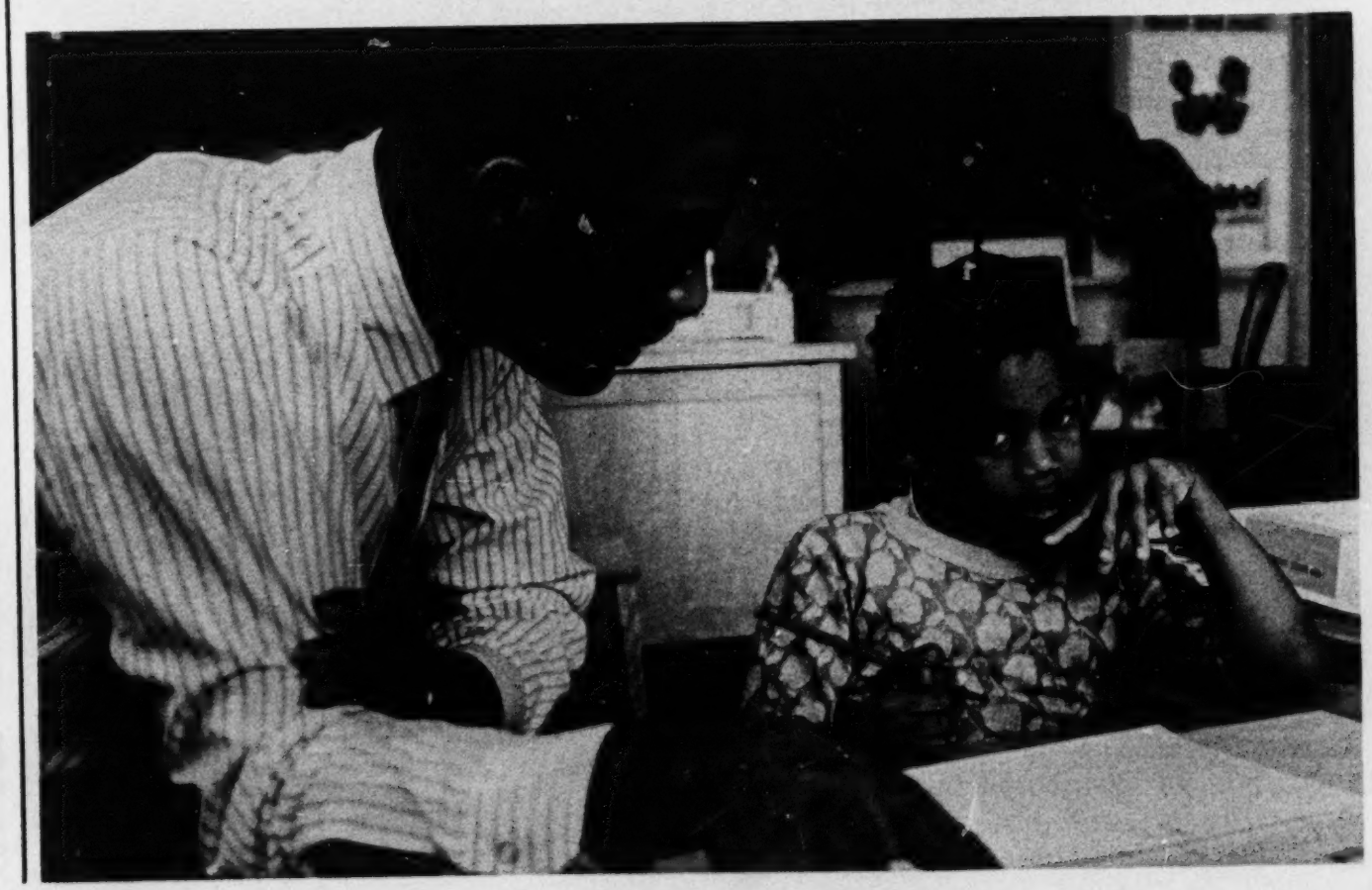
Teachers react to diagnosis without material selection in a very negative way. Frequently they either do not refer the children who are having educational problems, or they use a diagnostic finding to get the children transferred out of their classrooms. As a result of this problem we have established a prescriptive materials retrieval system (PMRS) to enable teachers to locate appropriate instuctional materials quickly. One of the first steps in setting up the system is an analysis of the



instructional materials. The analyst must know exactly what elements compose the material, the amounts of the various componenets, and how they interact with each other. The procedure of analysis requires a practical identification of educational materials so that they might be coded into the prescriptive materials retrieval system. For each instructional package one goes through the analysis process, breaking the material down into different areas to be coded into the system.

Once the materials are coded, the thesaurus can be used to get back to the material. All instructional material in a PMRS is divided by an indexing language of over 400 descriptives. The first step is to assign the educational material to a major area. Quite often we will assign an item to more than one major area, since cross referencing provides greater efficiency. For example, the *Peabody Language Development Kit* would be coded under speech and language, correlated reading, language arts, and reading readiness.

The next step is to assign materials to the mental age levels indicated by the author or publisher. Next the material is given a format descriptor that is an indication of whether the material is an audiotape, a filmstrip, or a print publication. This is important for the teacher who is trying to match characteristics of materials to problems of students. For example, if you had a child who responded to auditory stimuli or outside noise, you might want to select material in a tape format so that you could use earphones to cut out the distracting stimuli. In addition to those format descriptors, the new classifications require input and output descriptors which will allow for more modality selection. For example, the input may be audiotape or auditory, while output, or student production, may be verbal or voice.

The next phase is the specific content analysis. This is the most important because it is a breakdown into the components of the materials. The thesaurus then, which lists all of these descriptives, will contain several hundred of the specific content analysis descriptors. An instructional material may require multiple coding and cross referencing. For example, you may want to put in blends of major consonants and short vowels.

Process descriptors, or a description of the cognitive or affective process the child would need to apply, are also assigned to the materials. These primarily include the ITPA descriptors. The final outcome of the coding process is the descriptive analysis sheet, an abstract of how the author or publisher describes the material. It is the final outcome of using this particular retrieval system.

The prescriptive materials retrieval system transmits information by providing the user with information that will aid him in deciding if he wishes to examine the original material. The descriptive analysis sheet describes the ways the material is presented by the author or the publisher. It outlines organization of the material, special techniques that need to be used with it, and the method of presentation. The analysis sheet describes illustration - the type, the number, and placement. It talks about vocabulary, new words that are introduced per page, and the reading level of the particular material.

In addition, the descriptive analysis sheet explains such things as the number of pages or length of time in the case of the audiotape covered in the material. And very important,

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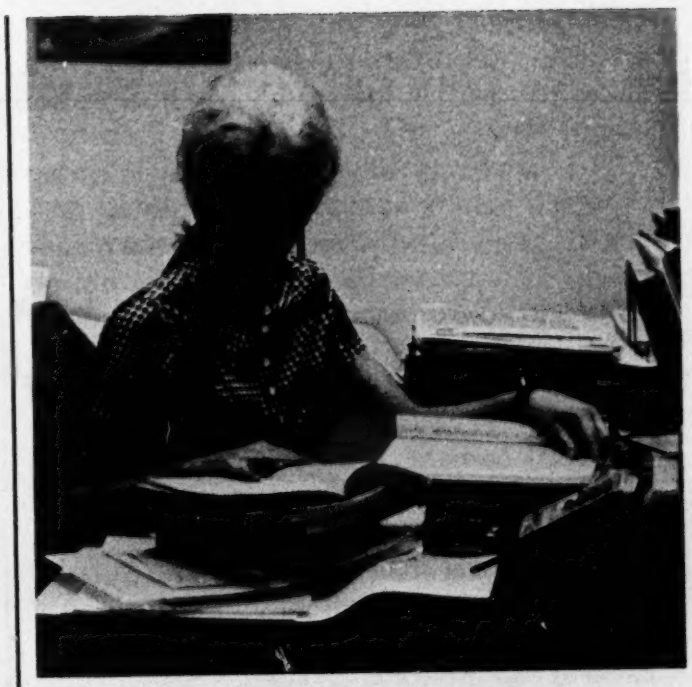
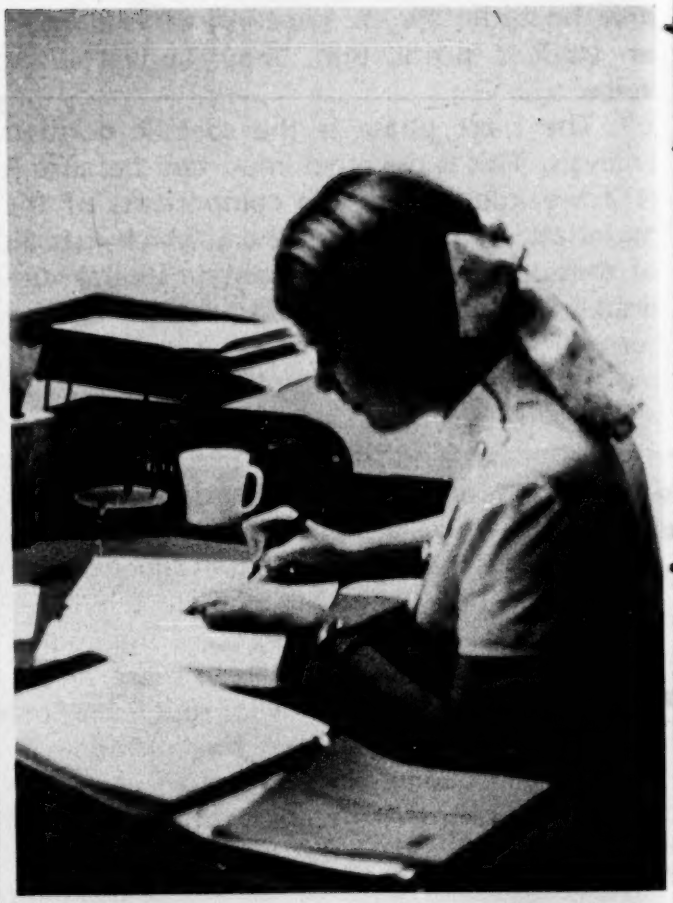


it talks about teacher time — the time it takes the teacher to prepare the lesson and the time it takes to instruct the student on how to use the material.

The gathering of such detailed information which results in a large collection of documents is useless, however, without the means to recall or retrieve the specific information desired. Searching each stored document fo· desired information is tedious and time consuming. Experience has proven that there are many methods of retrieval. However, the type of material demanded by the prescriptive materials laboratory must be much more precise than that of the traditional library. We chose to use an optical matrix system. This type of information retrieval system uses a single card to represent one descriptor. There are over 400 cards representing 400 descriptors.

For example, if you wish to use the prescriptive materials retrieval system, you would first have to start with diagnosis. Let us assume that we are going to diagnose or prescribe materials for a second grade level child with final consonant problems, the teacher desiring material in a workbook format. The thesaurus then contains the appropriate and precise descriptors to use to search the prescriptive materials retrieval system and locate the best fitting material. The main purpose the thesaurus serves is to provide a vehicle to translate user need into the language of the retrieval system. The thesaurus is divided into five sections, and the first section lists the specific content descriptors. It is from this group that specific problem areas are selected. (Gary Adamson)



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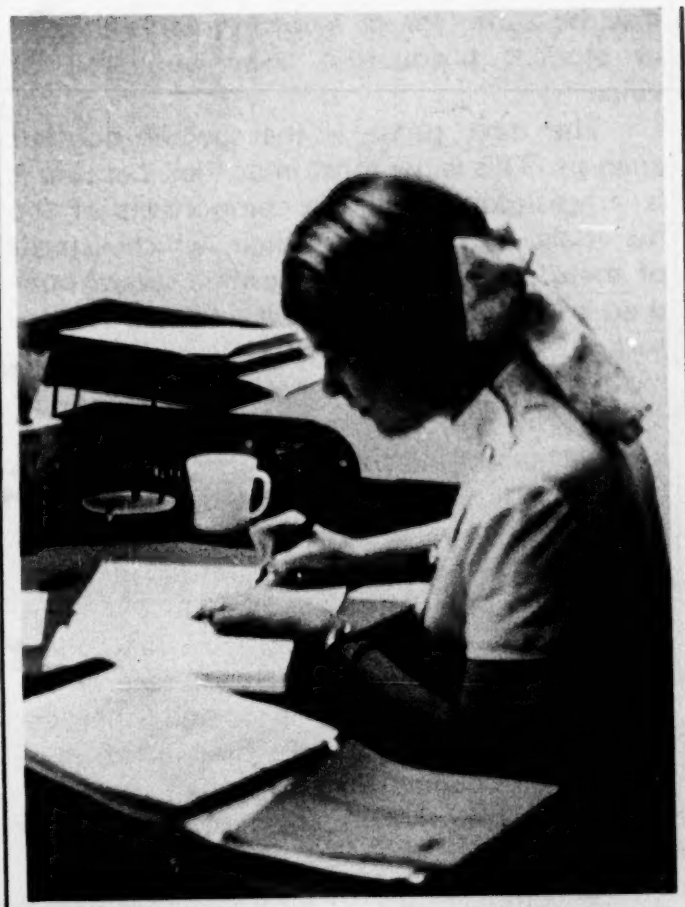

Instructional Resource Centers are planning systems which enable teachers to order materials on short notice, supporting flexibility and spontaneity in the classroom.

The educator should not have to order his materials until after he has surveyed the specific needs of his students. I would like to emphasize this point to administrators. At the material center we have had many teachers come into us and say, "I'm to plan my program and order materials for my class for the coming academic year. How can I do that when I don't even know what students I will have?" How can a teacher really order the materials that she needs? When teachers are forced because of administrative policy to buy a year in advance materials that they might need, either of two things can happen: if the materials are inappropriate they will not be used, or the students will be made to fit the material regardless of their needs. (Lenore Powell)

Instructional Resource Centers are developing systems of storage for materials and equipment close to the classroom to support variety and flexibility through the teaching-learning process.

Do your teachers come to the IMC to pick up their materials?

No. For example, we have several central picture files. We have one in the primary school, one in the elementary school, one in the junior high, and one in the high school. We try, if possible, not to keep materials stored in the center because it is away from the classroom.

The closer we can get these materials to the classroom, the better off our teachers and students are.

New roles for the Instructional Resource Centers in education demand that the media specialist have a broad range of skills.

There seems to be a consensus that the media specialists of the 70's will manage some sort of a resource library including print and nonprint materials for teaching and for individual study by students. The term resourceteria seems to describe what we see emerging here. The specialists will also manage an equipment shop that will acquire, store, service, transport, operate, and adapt equipment for the special needs of teachers and students. A local production shop will also be supervised for photography, recording, duplicating, artwork, and mounting. As individual study in the resourceteria continues to expand, the specialist might be expected to supervise the individual study carried on there. Constant inservice education will be required for the foreseeable future. Innovation shows no signs of decreasing, but instead shows constant signs of expansion. The media specialist should have wide opportunity to observe innovative equipment, materials, facilities, and practices and to report all the desirable examples to his teachers. The media specialist needs to be a professional consultant to his administrators in all areas of media and to all people concerned with school construction, innovation, etc. In other words, the media specialist of the 70's is the professional leader in all aspects of technological application to all forms of education. (Raymond Wyman)

Media should be planned for in curriculum design rather than at the classroom door.

There are three phases in the technology of a curriculum: (a) setting objectives for the curriculum, (b) planning to fulfill those objectives, and (c) implementation of curriculum. Too often the audiovisual component is chosen at the implementation level when the teacher is ready to use it in the classroom. It is our opinion that for effective use of media, it has to be considered at the planning level. Only in this way can teachers effectively enlist media in the service of filling specific behavioral objectives rather than using them as a last minute entertainment bandaid to liven up a dull session. (Hubert Summers)

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Media may move special education towards more curriculum development.

Without systematically developed curriculum, we are at a disadvantage in determining which technologies are most relevant to our needs. The lack of investment in curriculum development for exceptional children places us in a precarious position relative to employment of technology, but it does make the need for curriculum development even more pressing. (Edward Meyen)

PLANNING THE DEVELOPMENT OF INSTRUCTIONAL MATERIALS

Language levels need special attention in designing materials for deaf students.

What is the difference between materials which you prepare and those commercially available?

Basically we have to concentrate on language development in preparing our materials. Most of the commercially prepared materials that have captions or language written on them are not suitable for our students. Our students are not retarded, but their language development is different in many respects.

Materials can be designed to take advantage of the psychological and cognitive characteristics of the student.

Some of the aspects of programing which have been shown by curriculum and media research and formative evaluation to affect cognitive learning are: (a) the pacing of information dissemination, (b) the sequencing of information in dissemination chains, (c) the frequency with which information is disseminated, (d) the frequency of required pupil response, (e) the type of feedback given to pupil response, (f) the spacing of information per unit of time, and (g) the instructional mode of presentation utilized. Some of the

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Some of the factors which have been shown not to affect cognitive learning adversely are: (a) the use of musical background as long as the db level of the music at crucial information dissemination points is kept below the db level of the narration which is disseminating the information and (b) color fidelity and clarity of slides or visuals, unless color is a necessary factor involved in the program objectives or the reading of printed statements on the visual is hampered by blurring. Some of the factors which have been shown not to influence affective learning are: (a) the provision of musical background either in terms of attitudes towards the media, the social behavior, or the consequences which are being portrayed and (b) the direct presentation of consequences without taking into account the psychological complexion of the subjects for whom the program is designed.

Still other factors which frequently come up in the development and improvement of programs have an unknown effect on pupil learning. For example, hypotheses might legitimately be raised about the language style

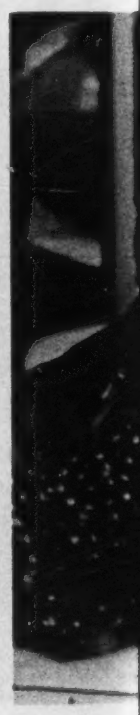
used in the writing of program scripts. One might argue, for example, that language written in the current vernacular or slang of an adolescant age sample might better reach them and therefore make them more attentive to the program, thus increasing their cognitive learning. One might suggest that the more "turned on" by the program the subjects are, the more apt they are to believe in the reality of the consequences of acts portrayed and, therefore, create the necessary conditions to change attitudes.

Some subliminal information regarding this has been found in our own research and evaluation work in contrasting two programs ("A Saturday Afternoon" and "What Happens When You Steal?") developed at the SEIMC at Wisconsin. "A Saturday Afternoon" was written much more in the style or vernacular of the adolescents for whom it was designed than was the script of "What Happens When You Steal?" Also, "A Saturday Afternoon" contained a much higher proportion of dialogue than the "What Happens When You Steal?" script. The average increase in learning both in the cognitive and affective category was substantially greater for "A Saturday Afternoon" than for "What Happens When You Steal?". This learning difference, however, cannot be entirely attributed to the different language used in the two programs since many other factors differed as well. It does, however, suggest an avenue for future curriculum and media research.

Another factor which has an unknown effect on pupil learning is, for lack of a better name, the amount of "schmaltz." Visually "schmaltz" can be introduced by dramatization (e.g. photograph of Mary with a tear in her eye taken from "What Happens When You Steal?"), shock appeal (e.g. the photograph of policewoman unzipping Mary's dress in order to search her for other possible stolen items), special lighting effect (e.g. "Juvenile Department" sign taken from "What Happens When You Steal?"), and angle effects (e.g. accident scene from "A Saturday Afternoon"; store manager leaving from "What Happens When You Steal?"). (Jenny Armstrong)

Prepackaged educational materials can be designed so a teacher can modify them to fit her students' needs.

These masters come in a packet which we distribute free to schools for the deaf. Each teacher can make as many transparencies as they want from the same master. It is designed so teachers can change and modify it for their own situations. The reason we did not make permanent transparencies is that it would be very difficult for teachers to change them. We're giving the teacher the flexibility of manipulating what we have as a base. We consider the packet a resource file, and teachers can develop it further or not use all of it — whatever fits the needs of their students. (Ronald Kelly)



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A total system to validate and evaluate instructional materials can be designed from presently existing educational facilities despite the many current problems involved in the validation of instructional materials.

If we use the procedural format for the development and validation of programed instructional materials, we realize that materials basically go through a tryout, evaluation, and validation sequence. Tryout is the testing of materials with a few "local" students. This can usually be done with rough sketches, mock-ups, etc. Evaluation is the next level, i.e. a school district, county, or perhaps several similar populations. This stage can include finalized but not yet "fixed" materials - flexible enough to allow revision. The last step, validation, tests a much wider universe with the final product.

In order to design materials which will be of educational use we need to consider the criteria teachers use to guide their selection of materials. Popham has illustrated the three criteria most frequently used by educators:

1. The Content Criterion - Here we ask about the adequacy of content. Does it reflect the current trends? The main weakness of this criterion stems from the subjective judgement reflecting the user's preference.
2. The Cosmetic Criterion - This criterion discusses the manner in which the materials are packaged. *Anyone* is susceptible to the wiles of good sales promotion.

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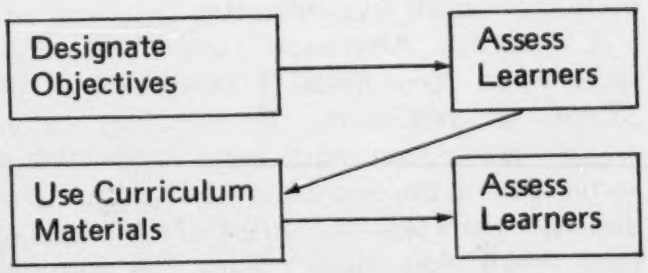
2. The Cosmetic Criterion - This criterion discusses the manner in which the materials are packaged. *Anyone* is susceptible to the wiles of good sales promotion.

3. The Charisma Criterion - The stature of the author, the designer, and the publisher play a significant role in materials selection.

The three "C's" — content, cosmetic, charisma — unfortunately constitute a rather weak and subjective base for selection, hence validity becomes a complex problem for the materials designer.

A second model for validation is one suggested by UCLA which can be schematically shown as follows:



This schema obviously is based on the selection or construction of operationally stated instructional objectives. It implies pre- and posttest measures.

I believe there is one step missing. There should be a needs assessment preceding the first box. Objectives can be stated subjectively and objectively. As we look to objective statements we rely on a consensus of experts. What we frequently fail to do is involve the *consumer*. In special education we need to analyze carefully whether or not the curriculum is directly related to what the teacher needs and actually uses in the classroom or whether the materials designer feels it is "nice to know." In brief, I would submit that materials and curricula have focused

predominantly on cognitive development at the expense of development in the affective areas. And yet the affective areas are important to the teacher. We are all painfully aware of the handicapped individual who, in spite of rather severe academic disabilities, "gets along beautifully" because he has developed the skills of human interaction.

Also, we often fail to ask ourselves what the learner must know *before* he can use the materials we are developing. Without this knowledge the teacher can use the materials, watch them fail (not because of their design but because the student did not have the requisite skills), and perceive them as ineffective materials.

Some of the constraints in the validation of materials include:

1. Teacher variables - Teachers need enthusiasm, methodology, and an understanding of the materials.
2. Motivation - Materials and programed instruction are often unattractive or fail to elicit child identification. Media can have a passive habituating effect. We have often failed to spend the time necessary to show "why" materials are important to the learner. This is critical to all learning.
3. Time - School systems need to design and develop effective materials, select or construct operationally stated objectives, and determine measures necessary for validation.
4. Program administration - Failure to describe the materials and orient and train the users of materials on the why and how leads to questionable validation both up and down the scale. The lack of followup is also pertinent.
5. Norm-referenced and criterion-referenced assessment - Attainment and success in schools is usually reportable only in terms of standardized tests, although criterion tests and behavior change can show that learning, other than the academic learning picked up by standardized tests, has taken place. It is difficult to correlate such data with normative measures. This is a special dilemma in our field.

What can be done? What are our resources?

1. Popham suggests EPIE (Educational Products Information Exchange) which, though it has devoted most of its time to hardware, plans to undertake evaluation of curriculum materials, and the Instructional Objectives Center, UCLA, which will be able to provide behaviorally oriented objectives by field study and grade level. From the entire pool a school will then be able to select the objectives applicable for their children.
2. SEIMC/RMC Network - The network has focused on the development of materials. Many of the 300 associate centers have conducted validation studies. This is a tremendous resource for solving and coordinating validation efforts.
3. The National Center of Educational Media and Materials for the Handicapped - With the advent of the National Center, a pooling of extant resources and criteria along with the development of new strategies in design, development, and validation of modules will ensue. The center should provide a vehicle for storage and retrieval of validation information. It will work with the SEIMC/RMC to dissem-

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4. Commercial Producers - The above mentioned activities, the broader "market" including special education, disadvantaged, bilingual, foreign born, etc. will be instrumental in doing more than attracting the producers. Eventually commercial producers will make real strides in validation of materials as special education begins to rely on a broad, effective system of validation. (Gilbert Delgado)

PLANNING SUPPORT FOR TEACHERS IN THEIR USE OF MEDIA

Effective inservice workshops are those which provide a one-to-one learning experience for the teacher.

Too many inservice workshops are a pouring in of information with no interactive communication or involvement on the part of the teacher we are trying to teach.

The materials lab coordinator is an important inservice one-to-one person. In our experience individualized instruction is the most successful. It's almost impossible to get teachers involved in sessions to take what they have learned back to the classroom if they don't have someone there who shows them how to use the materials comfortably and lets them practice in the inservice sessions.

The materials lab coordinator is an important person in inservice training. He has the skills to share with teachers and must feel comfortable working with them on a one-to-one level.

We also plan our inservice workshops around problem areas rather than grade levels. We have found that teachers become more readily involved if we are presenting materials which fill an immediate need. (Gary Adamson)

ACHERS IN THEIR USE OF MEDIA

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Teachers are more likely to adopt and adapt new techniques learned in workshops if the workshop is designed to provide them with some direct experience using the new technique.

Some attempts to teach instructional techniques to teachers have been less than successful because of failure to employ the right techniques to *teach* the new ones. Typically, lectures are given to teach teachers on the efficacy of discussion groups; discussion groups are employed to teach the uses of tape recordings. Tape recordings are used to teach about the use of films; films are used to show examples of team teaching. In effect, we sometimes use an irrelevant and outmoded technique to "teach about" some other medium, and we wonder why we have a difficult time convincing teachers of the value of the new technique. If the medium is the message, as Marshall McLuhan suggests, we are contradicting ourselves when we use an irrelevant medium to teach educational technology. Whenever we are trying to impress people with the potentialities of a given instructional procedure, it is preferable to use that medium to demonstrate itself. In such a case there is reinforcement between the medium and the message.

The question of consistency of medium and message is not always a matter of

identical medium and message. The real issue is what we do want to have people *do* with the new information. If we want them only to *know about* something we can often provide this information through a more passive medium such as the lecture. If on the other hand we feel that adoption would be enhanced by opportunities to experience more directly the use of the particular technology, we must provide opportunities for people to experience the technology in their own learning environment. (Ted Ward, Joseph Levine)

Teachers need administrative support in the use of media.

One thing that was learned early in the development of the Center is that although an individual teacher may be highly motivated to become involved in an innovative procedure, lack of administrative or supervisory support can quickly extinguish the enthusiasm. As a result, we have designed workshops for supervisors and administrators. We have taken special care to see that each teacher participant in our summer institute programs is accompanied by a supervisory level person from his or her school, or at least that such a person from his or her school has attended an institute in the past year.

We have developed a 4 day workshop for administrators and supervisors on techniques and procedures of systematic design of instruction. We anticipate that with a little additional training and with material and consultant support some of these supervisory level personnel will be able to extend the training to others in their own schools.

Within the context of our shortterm media workshops for teachers, we emphasize behavioral objectives as a basis for design of mediated lessons and for evaluation of those same lessons. A similar approach is used within the context of our Project Hurdle. Project Hurdle is a program in which a media specialist from our staff is placed in a school perhaps for several weeks to provide inservice training in media production and utilization. (Hubert Summers)

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Teachers need information about resources at their fingertips for imaginative planning and use of media.

Educators need to know resources such as IMC's district depositories, audiovisual supply companies, and university services for obtaining media, and they need to know the availability of the desired media in terms of time, distance, cost, and loan policy. Preplanning is essential in the use of media. To insure success, alternate plans should be formulated. (Lenore Powell)

An imaginative and effective inservice training system can be designed if the planner first assesses all the facilities extant which could be part of the system and then builds the necessary relationships to ensure the working success of the system.

The Special Education Curriculum Development Center (SECDC) model developed at the University of Iowa in 1966 continues to operate today as a statewide inservice training program for teachers of the mentally retarded. This model is an example of one which embraces the above criterion for systems design. This particular model is organized as follows:

1. Cooperation among systems developed and sponsored by the Iowa State Department of Public Instruction and the University of Iowa;
2. Statewide coverage based on 16 geographic areas;
3. Use of master special education teachers as inservice educators (consulting teachers);
4. Development of special materials by the staff for dissemination throughout the entire system for consistency and to facilitate communications between components of the system. All consulting teachers receive the same training and guidelines for their presentations which are then used to conduct field sessions monthly. Reimbursement for expenses and presentation of a small honorarium is necessary as a motivating force since it reminds them that the State Department views their task as a critical one;
5. Coordination of field sessions by State Department consultants; and
6. Development of materials at the University of Iowa which are published by an intermediate school district.

The past three years of the project were supported in part by a grant from the Bureau of Education for the Handicapped. It is now in its second year of operation on state resources.

These training sessions are conducted on a voluntary basis. We were impressed by the fact that the enrollment in the field session increased from 508 in 1967 to 807 in 1969. The average attendance per month in 1969 was approximately 700. Approximately 90 percent of all teachers of the mentally retarded participate. (Edward Meyen).

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Teacher Training Packages

"In view of the complex teaching tasks
teachers of the handicapped face daily,
we should be at the forefront
in exploring the application of technology
for instructional purposes. For the most part,
this is not the case."

Edward Meyen

PRESERVICE AND INSERVICE TEACHER TRAINING PROGRAMS

Participants offered plans for mediated packages designed to solve training problems of the '70's: increasing number of trainees, on-the-job training, and the open university concept.

Application: **Preservice training for teachers of educationally handicapped; classroom behavior analysis.**

Media: **Videotape and 8mm single concept film loop**

We have had experience using videotape in our teacher training program. One semester we provided each student in the methods course with a half-hour videotape. Each student trainee recorded his own classroom performance and then did an analysis of the tape using a modified *Flanders' Interaction Analysis Scale.* Each could play back immediately. Thirty half-inch tapes cost about $25 for each half-hour. Now we can re-use those 30 tapes.

We sometimes use the 8mm single concept film loop. It has some advantages over video equipment. For example, 8mm single concept film loop has rapid replay

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We sometimes use the 8mm single concept film loop. It has some advantages over video equipment. For example, 8mm single concept film loop has rapid replay when trainees want to observe the same sequential behaviors of a student over and over. Another advantage is that with short notice it is much easier to get access to a 8mm loop projector than to the TV channels in the school of education.

For the longitudinal studies, we mentioned Flanders' Interaction Analysis of classroom teaching. One of his unpublished findings was that any small segment of a lesson tended to have the same characteristics as the entire lesson or the entire sequence of the four lessons. So you may get the same amount of data taping a 5 or 10 minute spot without going through the whole hour. The feeling is that over a period of time you'll pick up the teacher's or a child's characteristics within short spots as well as you could by taping an entire lesson. This alleviates the problem of reviewing a one hour tape.

I make one exception to this. When we look at our tapes with our preservice teachers working with moderately and severly retarded children, we run into problems with the children during transition periods which we don't see within the lesson. Problems occur when they move from one activity to another or from one kind of lesson presentation to another. We are using videotapes to help identify those problem areas. (Larry Thompson)

Application: **Inservice training and communications.**

Media: **Videotape**

We use the tapes for inservice training with teachers in our special school for children. I don't think there is a teacher who can't improve himself by viewing his tape or the tape of another teacher.

Also, for dissemination to the other teachers in the county we use videotapes filmed in our special school for educationally handicapped children. We have been especially interested in reaching the elementary teacher, who possibly has a child with a learning disability, but for some reason that child must remain in the regular classroom. In this way we can introduce county teachers to the procedures we use. We're using many special techniques and find that it is helpful for teachers in regular classrooms to become as aware of special techniques as is possible.

We do use the videotapes as an informational program. These children do live throughout the county, their lives are touched by civic groups, by neighbors, by the high school kids. All of these people should know as much as they can about the type of children we serve. (Betty Howe, Jane Courtney)

Application: **Self evaluation of classroom skills.**

Media: **Videotapes, films; minicourses**

The educational products that we have been developing at the Far West Laboratory are called minicourses. A minicourse is a carefully tested and validated educational package designed to help teachers improve specific instructional skills. The typical minicourse deals with about a dozen highly specific teaching skills. During the 15 hours required to complete a minicourse, the teacher devotes about 4 hours to viewing films which give a

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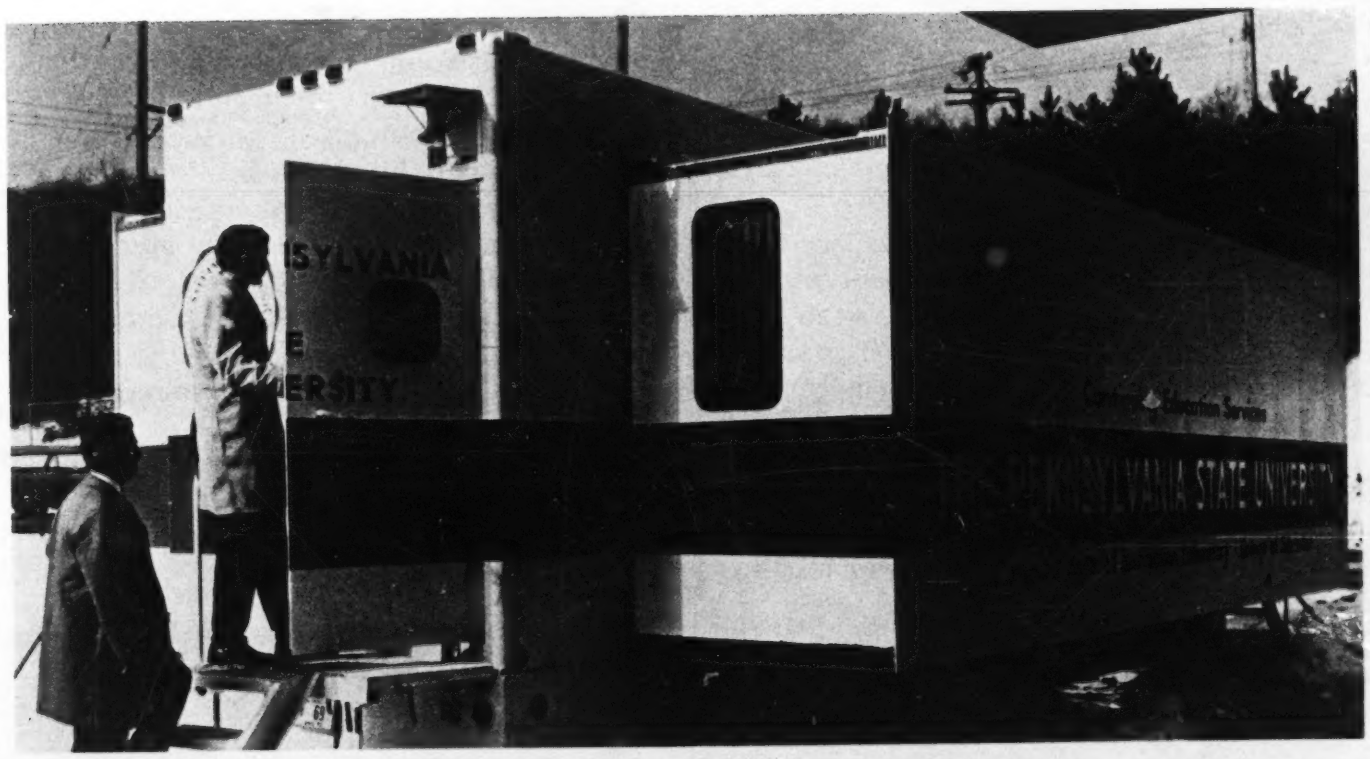
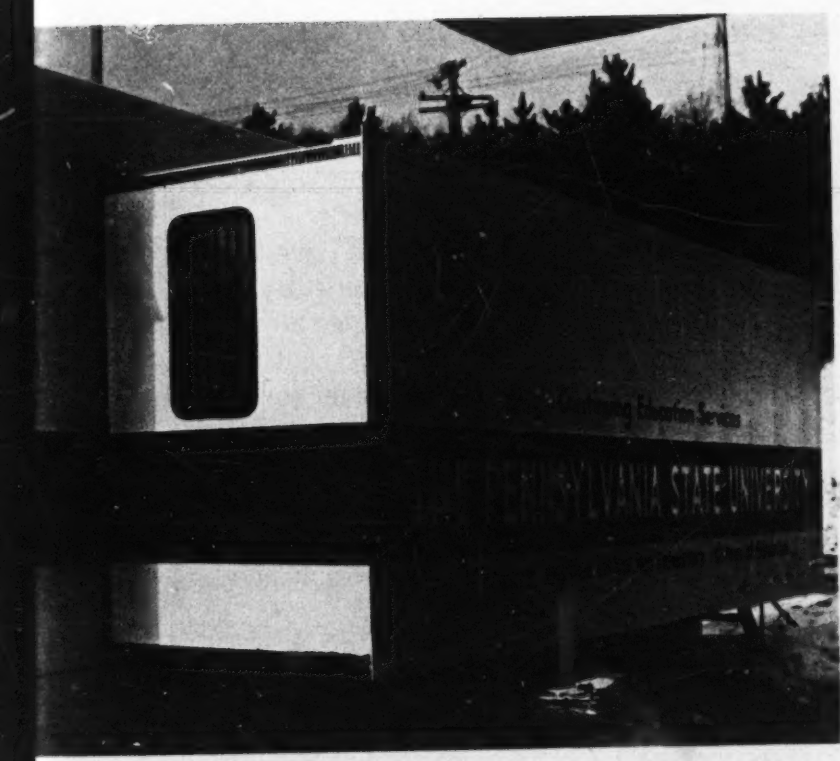


Application: **To train elementary teachers to identify handicapped children in their classrooms.**

Media: **Computer Assisted Instruction**

Under grant support from the Bureau of Education for the Handicapped and the Bureau of Educational Personnel Development at USOE, personnel at the Pennsylvania State University have developed an inservice computer assisted instruction course (CAI) in special education for teachers. The course, called CARE (Computer Assisted Remedial Education), is a completely self contained 3 credit college level, computer assisted instruction (CAI) course which deals with the identification of handicapping conditions in children. The purpose of CARE is to give inservice preschool and primary teachers of seemingly typical children the knowledge and skills necessary to identify for treatment children who might otherwise develop learning problems by the age of 9 or 10. The course is designed to promote clinical sensitivity on the part of regular classroom teachers and to develop in them a diagnostic awareness and understanding of the strengths and weaknesses of handicapped and normal children. Hopefully, teachers who complete the 35 hour course will be able to systematically evaluate childrens' learning potential and to formulate appropriate educational plans for the children.

The special education course is given to a wide audience of teachers via an entirely new concept in continuing education.



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The special education course is given to a wide audience of teachers via an entirely new concept in continuing education. Instruction is individualized for participants by means of a computer assisted instruction system. Approximately 150 teachers can complete the course in 6 weeks, about 1,000 teachers per year.

Objectives. Upon completion of the CAI course, participants will have achieved the following objectives:

1. Knowledge of the characteristics of handicapped children and awareness of symptoms indicative of potential learning problems;
2. Ability to screen children in regular classroom programs for deviations and to determine the extent of the interindividual differences;
3. Ability to select and use for those children with deviations, appropriate commercial and teacher constructed appraisal and diagnostic procedures to obtain more precise information about the nature of the deviation;
4. Ability to synthesize information by preparing individual profiles of each child's strengths and weaknesses on educationally relevant variables;
5. Ability to evaluate the adequacy of the information available for making decisions about referral to specialists;
6. Ability to prepare adequate documentation if the decision to refer is affirmative.

It is expected that teachers who exhibit the competencies listed above will systematically evaluate children's learning potential and formulate appropriate educational plans according to a decision process which is provided.

Some of the teachers are very pleased with this operation. Many are not ready to go back to a regular classroom. They find that the environment of the CAI system is much less threatening than a live teaching situation. They become very content with the system in a very short time.

Teachers can come as often as they like. Basically, we accommodate the teachers' schedule, which is after school 3:00 to 11:00 p.m. They can, however, come in at any time during the day. They can sign up for an hour or 10 hours a week, whenever they want to. It doesn't have to be the same time every week. We're open all day Saturday and Sunday. It's quite a variable length of time to complete this course. The average time is about 40 hours for completion, but it varies from 25 to 60 hours.

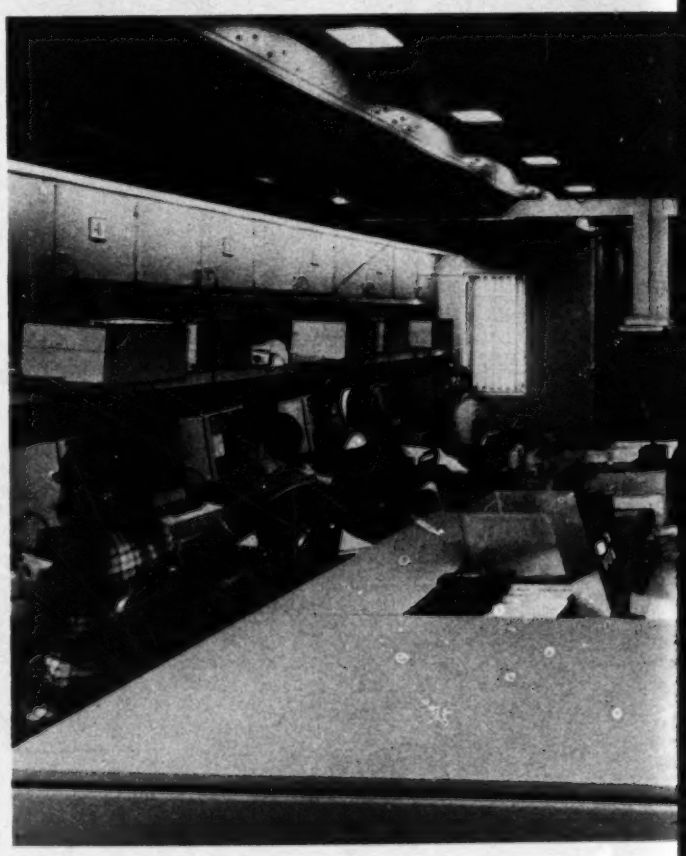
We have worked out equations so we can tell after only 2 to 3 hours of instruction how rapidly the student is proceeding. We encourage people who need additional hours to come in more often, so they can meet the completion time.

We have implemented this project in remote areas of Appalachia by using an expandable mobile van which converts into a 20x40 foot classroom. The van houses a complete 16 terminal CAI installation which permits 16 teachers to interact simultaneously with the computer. The mobile operation stays in these remote locations for periods of 6 to 8 weeks. (Harold Mitzel, Phillip Cartwright)

Application: **To train teachers of preschool children in remote geographic areas.**

Media: **Microtraining through videotapes and films**

Written materials *without* the intervention of a teacher educator are insufficient to change teachers' classroom behaviors. But with the advent of relatively inexpensive, easily operated, portable videotape recorders, it is possible to provide inservice education via videotape with 16mm color film. The nursery school staff selected activities around which instruction, such as language improvement,



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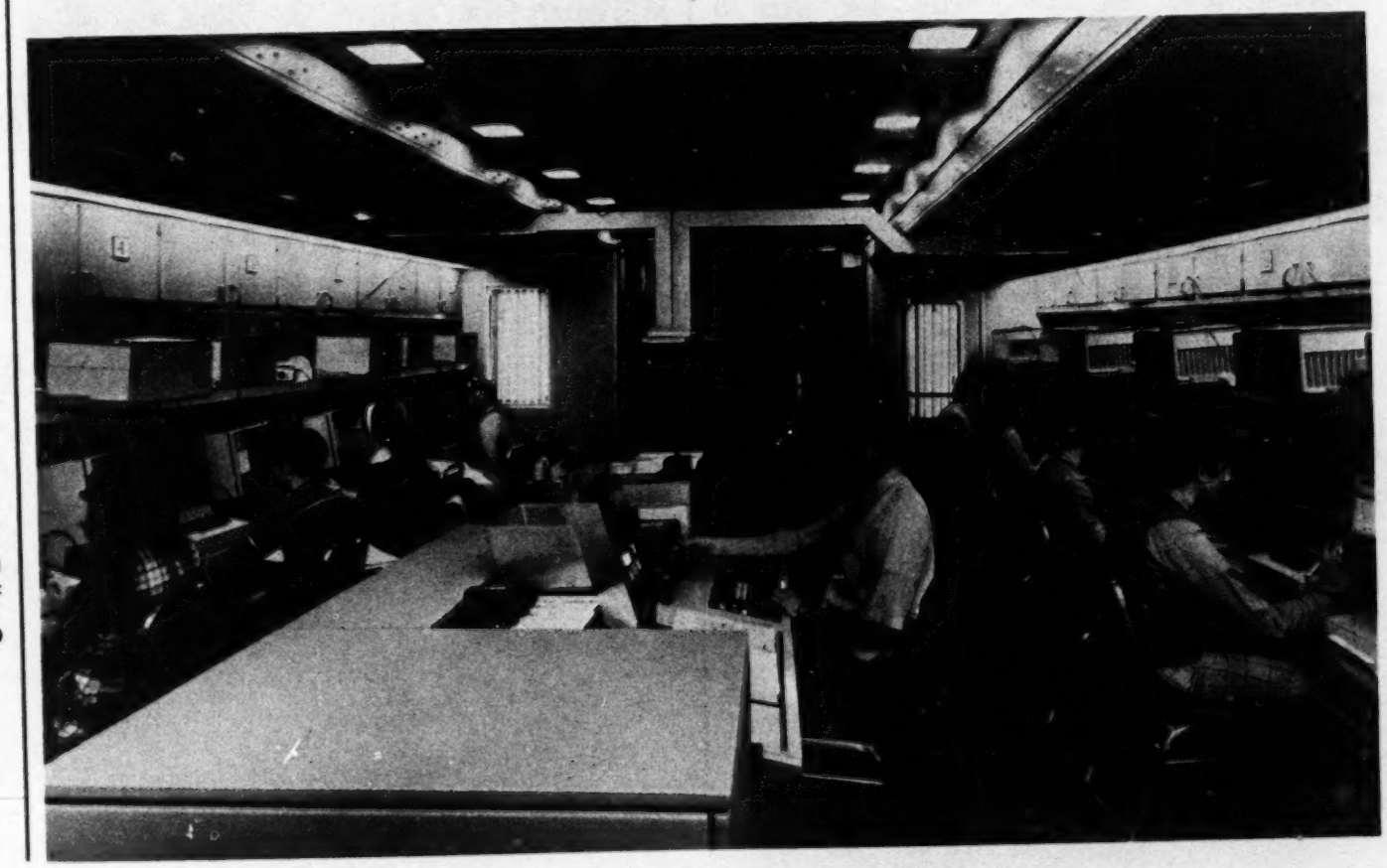
Administrators of the selected local projects identified at least 15 teacher aides interested in enrolling in this unique training program for which they could receive up to 5 quarter hours college credit.

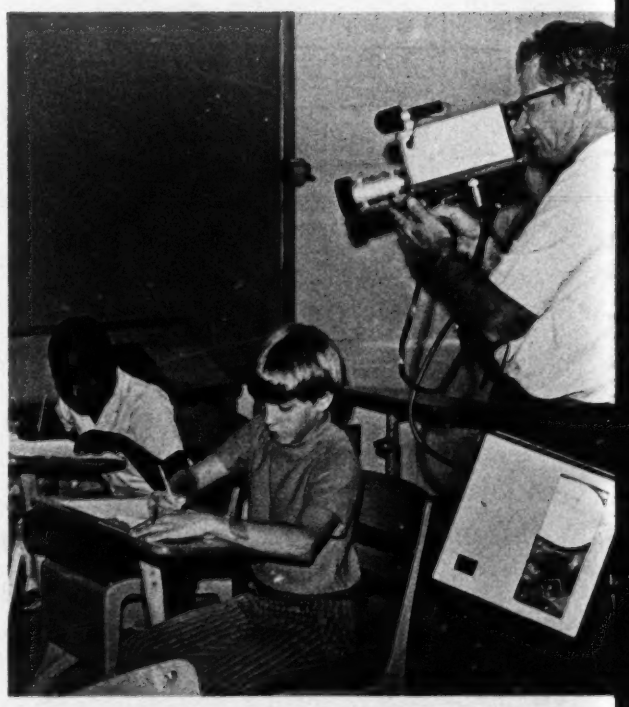
It is important to note that personal contact was maintained with each trainee throughout the training period, and the



Institute staff responded personally to questions and comments. The staff kept Polaroid pictures of each trainee. School principals assisted in participant selection and training. For most trainees the program was introduced during an intensive one week orientation session. These sessions involved learning specific content and processes suitable for meeting the needs of environmentally deprived and developmentally handicapped children. This mass input was followed by several months of distributed practice on the same content and procedures.

After the on-site orientation, trainees began the course in their own classroom. At regular intervals each trainee received a training unit by mail. This included a rationale for each unit and its relationship to the other units, four learning episodes which relate to the unit objective, a 16mm color-sound film demonstrating at least one of the learning episodes in actual classroom practice, written procedures for viewing and relating the training film to the unit, videotape on which each trainee recorded selected learning episodes, and "critique-ing" instruments which encouraged descriptive observation and allowed self evaluation. Trainees then read the written portion of each training unit, considering how the learning episode could apply to the learners in their classrooms. The trainees discovered that learning to teach with materials often requires that the teacher himself first perform the tasks prescribed for the children.

Several learning episodes required the teacher to prepare the materials for that unit himself. After preparation the teacher tried the learning episode with his children. This initial tryout is the first of five steps in



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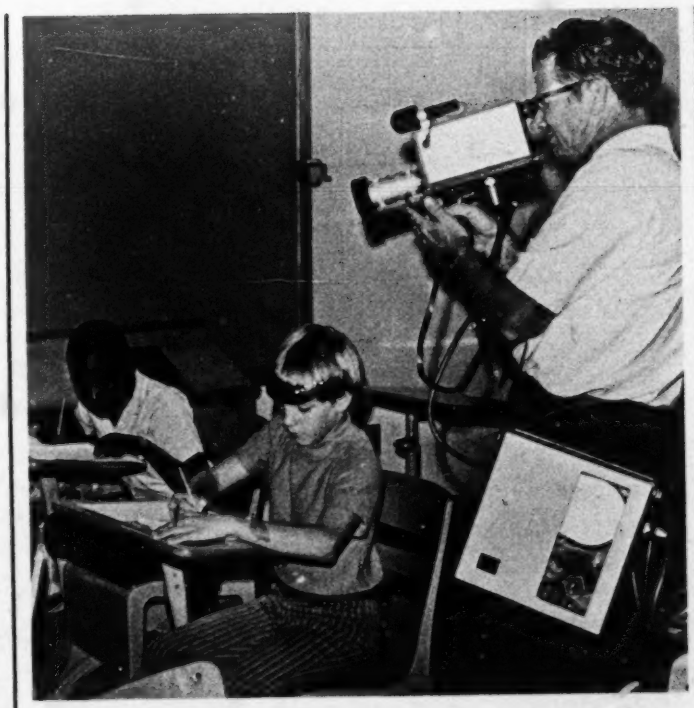

microtraining. The five R's include recording, reviewing, responding, refining, and reteaching. Basically, I think this program of *Microtraining Teachers* is like taking an excerpt out of something. The videotape of daily activities can show a teacher his good points as well as his bad points to help him improve and teach effectively. The teacher can do this program by himself by presetting the camera on the group of children he is working with and leaving the TV set turned around so that they can't see themselves. An aide in the class can run the camera. The teacher first looks at the tape and if satisfied with it sends it in to our center to be critiqued by our educational specialists. After it is critiqued, it is sent back to him with comments on his use of no more than three of our particular learning episodes. We have four so called learning episodes in each training unit, which gives us a total of 64 learning episodes with children.

It takes about 9 months for a teacher to go through this process. By the end of the year he becomes rather sophisticated. In our district there are many sites that require remote teacher training. There are a lot of Indian reservations that need a tremendous amount of help. We invite the reservation teachers to come in for three one week sessions at the Medical Center. They receive training in the physiological rather than psychological aspects of child development. We try to give them an understanding of reasonable expectations for preschool children. Some of these people have not had formal teacher training but are doing a tremendous job. This is one of the basic ideas for the program, to train people for service in early childhood education.

Each of the six sites had a six member staff. We worked on a geometric progression in which we multiplied our effect areas and spread our program by training satellite teams. We have been using the half-inch videotape machine which is much cheaper. It is portable, economical, and easy to operate. The half-inch tapes can be easily mailed to us for critiques. The main idea is for teachers to get a mirror of what they are doing and whether or not they are doing it effectively. In the language of the five R's of microtraining:

Record The trainee videotapes himself presenting a brief, 3 to 7 minute learning episode to a small group of children.

Review The trainee replays the videotape, observing the strengths and weaknesses of his performance in comparison to the filmed and/or written examples.

Respond The trainee critiques and acknowledges the lesson's strengths and weaknesses.

Refine The trainee incorporates one or two changes indicated for a restructuring of the learning episode, assuring greater success in the next attempt.

Repeat The trainee videotapes his performance during the refined learning episode and this process continues until the task performance is mastered.

Microtraining methods and materials to enable teachers to better individualize instruction and to alert school related professionals to the necessity of making their recom tions more practical are primary objec such lessons. Actually subjecting recommendations to trial with the ch making a videotape recording of the p ings is a very dramatic way of demon the relative efficacy of various recom tions and their relationship to diagnose a followup procedure insures greater in subsequent recommendations for cla disorders. The subject matter is limit by the trainer's imagination. A large toire of teaching/learning strategies fo variety of children can be model eventually mastered by the trainees. U ly, a library of model film clips videotapes will be generated which strate how persons in different p throughout the country manage classroom learning situations and co individual learning disabilities. (Wil Borthic)

to the necessity of making their recommendations more practical are primary objectives of such lessons. Actually subjecting specific recommendations to trial with the child and making a videotape recording of the proceedings is a very dramatic way of demonstrating the relative efficacy of various recommendations and their relationship to diagnoses. Such a followup procedure insures greater realism in subsequent recommendations for classroom disorders. The subject matter is limited only by the trainer's imagination. A large repertoire of teaching/learning strategies for a wide variety of children can be modeled and eventually mastered by the trainees. Ultimately, a library of model film clips and/or videotapes will be generated which demonstrate how persons in different programs throughout the country manage various classroom learning situations and cope with individual learning disabilities. (William A. Borthic)

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Additional Resources

Agencies

ERIC Clearinghouse on Educational Media and Technology, Institute for Communication Research, Stanford University, Stanford, California 94305

Special Education IMC/RMC Network, 1411 South Jefferson Davis Highway, Suite 927, Arlington, Virginia 22202

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Media Services and Captioned Films, US Office of Education, Bureau of Education for the Handicapped, Room 2026, 7th and D Sreets, S.W., Washington, D.C. 20202

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US Office of Education — Bureau of Libraries and Educational Technology, 400 Maryland Avenue, S.W., Room 5901, R.O.B. 3, Washington, D.C. 20202

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Educational Media, Educational Media, Inc., 1015 Florence Street, Fort Worth, Texas 76102

Educational Technology Educational Technology Publications, Inc., 456 Sylvan Avenue, Englewood Cliffs, New Jersey 07632

Audiovisual Instruction, Association for Educational Communications and Technology, 1201 Sixteenth Street, N.W., Washington, D.C. 20036

Audio Visual Communication Review, Association for Educational Communications and Technology, 1201 Sixteenth Street, N.W., Washington, D.C. 20036

PREP (Putting Research into Educational Practice), National Center for Educational Communication, US Office of Education, 400 Maryland Avenue, Washington, D.C. 20202

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